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ABSTRACT

This collection of papers explores the development of education in Nepal during the last twenty years. Frances Dart discusses the cultural conflict between American and underdeveloped countries--conflict which occurs when one group prizes the achievements or possessions of another on a mostly non-reciprocal basis. This is followed by an examination of some of the agents which brought about, in a centuries-old, largely dormant culture, a craving for education and development. The third paper reveals some of the pitfalls of trying to borrow another culture's educational system, or make-do with an imposed foreign system, and illustrates the necessity and process for relating curriculum content in science education to the indigenous characteristics of the culture. The final paper provides examples and suggestions in the field of art education. (Author/SHM)

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THE CHANGE PROCESS: WHAT WE CAN LEARN FROM NEPAL

A Symposium, prepared by
Hugh B. Wood, Francis E. Dart
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INTRODUCTION
Hugh B. Wood

Although American education has been a viable institution for many decades, it has seldom been confronted with as many challenges, as much conflict, and, fortunately, as many innovations and as much experimentation as today. As the educator contemplates this situation, and considers his behavioral reaction to it, it is imperative that he keep in mind two factors which can, and should, serve as major guidelines in determining his action:

(1) Education is a service to society and the individuals who make up that society: therefore, it should be thoroughly indigenous to the needs and aspirations of the society and people it serves; and

(2) Education is (or should be) a product of the society and the people it serves, and is constantly subject to innumerable forces--some good, some bad; obviously, these forces should come under continuous scrutiny and evaluation.

Three of the authors of this symposium have had the good fortune to serve as advisors in the development of an educational system for the small mountain kingdom of Nepal in the high Himalayas (one is a native Nepali). The Americans were constantly impressed by the fact that it is much easier to plan and develop a new educational system (where none has existed before) than to try to overhaul, reform, or patch up an existing system in a complex society like ours.

This symposium offers no panaceas for American educators, although there is much to be learned from a more detailed study, especially of the processes, of the development of education in Nepal during the last twenty years. The articles presented here represent the considered and mature reflections of the authors four to thirteen years after their service in Nepal. We believe that many of the thoughts presented here have relevance and significance for the American education scene today.

We begin the symposium with some observations on what happens when one culture "rubs" on another, especially when there is "value imbalance"--when one people prizes the achievements or posessions of the other on a mostly non-reciprocal basis. This is followed by an examination of some of the agents which brought about, in a centuries-old, largely dormant culture, a craving for education and development.

The third paper reveals some of the pitfalls of trying to borrow on other culture's educational system, or make-do with an imposed foreign system, and illustrates the necessity, and process, for

relating curriculum content to the indigenous characteristics of the culture, particularly in science education. The final paper, in a quite different way, provides examples and suggestions in the field of art education.

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THE RUB OF CULTURES*

Francis E. Dart

The thoughts that I record here began to take shape three years ago in a small mountain town in Nepal where my trip was interrupted by a three-day festival to Laksmi. I had been walking for eight days and was to walk nearly twenty more without once meeting a wheeled vehicle or any other evidence of mechanized civilization. Through dense tropical forests of sal a hundred feet above sea level, up steep slopes thick with rhododendron trees, along great cedared ridges cool even in the sun at 12,000 feet, I had been traveling in the only way one can in Nepal, on foot trails that are sometimes deserted, sometimes thronged with heavily burdened men and women moving in unison, their baskets weighted with new potatoes or ghee. Occasionally the trail would thread a village animated with the play of naked brown-skinned children, with cheerful old men in woolen shawls and shy dark-eyed girls carrying jars of water from the well--an irregular patch of mud-colored houses on the gold of ripening rice paddies surrounding it. With all its beauty and poverty and its growing desire for new ways, in the familiar jargon of our time, this was the underdeveloped country.

I had been asked to go to Nepal in order to teach science and to introduce new methods and equipment to the science teachers there. Soon after my arrival, however, and before I had started my project, it became clear that this was not really wanted, at any rate not by the teachers who would be most affected by my work. Equipment would certainly be acceptable, but not new methods and certainly not any direct teaching. I soon became convinced that the objections were not directed at me personally nor at American assistance and yet ran very much deeper than mere misunderstanding of words. It was more a matter of the social structure of a Nepalese college, which does not permit a professor to admit that there is anything more for him to learn, and of unwillingness to accept the changes that might result from a different sort of teaching. As a scientist or science teacher I would be very welcome, provided I did not do anything. In growing consternation, I began to see that I was to be more of a symbol than an active scientist--a sort of offering to be laid like a flower at the shrine of a modern deity. I was pretty sure I would wilt.

In the end I found many things to do, most of them inoffensive and some of them useful. During two years in this delightful country, I learned

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much about it and its people, but I learned on my own with practically no professional assistance. I was there as one member of a three-man team sent by the University of Oregon under contract with the International Cooperation Administration (the "point four" program of technical and economic assistance). At that time, the total American assistance to Nepal amounted to approximately $3,000,000 per year, about one-tenth of which was spent through the University of Oregon contract. The contract achieved its objectives of establishing a college of education, training Nepalese educators, setting up a press for textbook preparation, etc., and according to both Nepalese and American authorities it was among the best of all American-sponsored projects in Nepal. Notwithstanding this, it was beset as were the other projects with much waste and delay and with much uncertainty as to its long-range effectiveness largely because of discrepancies between American and Asian ways of doing things, and because neither side could easily understand and communicate with the other.

I recount all this because it is substantially the situation in a great many of the underdeveloped countries. American aid is offered and accepted at top government levels and then met with resistance or polite evasion when it is delivered. Particularly is this true when the aid involves changes in old ways or ideas. Yet these very countries are asking for assistance because they want to change. We, in our turn, are puzzled and exasperated, yet in our puzzlement we ourselves doubt the relevance or competence of our own social science. The very development of Western science which should help us the most we are unwilling to use. Bravely we struggle ahead without it, as though to show the world that we can do it anyway--even with half our brains tied behind us.

II

Asia today is a scene of intense and rapid change. Strong winds of economic, political and social innovation are sweeping through every corner of the continent, bringing in new institutions, new industries and technologies and a whole new attitude toward Asia's part in the world ahead. Taken together, these add up to a revolution to compare with any the world has seen. Beneath all the turmoil, however, there lies a vast inertia, a great ocean of people and tradition, slow to respond to the storm at the surface, yet moving with deep and powerful currents that are hardly noticed above. The immediate revolution, one which will in time reach down to stir even these depths, is basically the same over all of Asia and is, or will be, in most of Africa too. One might almost say that it started with Marco Polo or Saint Paul; with the Western merchants and the colonial governments that followed them to exploit the rich resources of the East; or with the Christian missionaries who brought with them schools and medicine and a new concept of individual worth. Together, they sowed their seeds of resentment and hope and new knowledge, unable, surely, to guess what might be the harvest of so mixed a planting.

After World War II, these elements exploded into a drive for independence and for living standards comparable, if possible, to those in the Western world. The people of the hitherto underdeveloped countries determined now to have food

enough and medicines, and yes, airplanes and wrist watches and nuclear reactors, too, and to have them on their own terms, free from Western exploitation. They wanted, also, to find and somehow adopt the concepts of equal justice, equal dignity, equal cosmic importance for all--concepts that the Westerner enjoys but has been unable to share. It is perhaps well to mention here that, in Asia at least, these things are wanted without Western religion, which is viewed with deep distrust. This is a fact of great significance, because in Asia religion is a vital and necessary part of living which, unlike Christianity, offers no strong motivation toward social change.

Not only are changes desired, they are desired in a great hurry. Generations of Western progress are to be absorbed in a decade or two and it is useless to suggest a slower, sounder pace, for the very continued existence of most political regimes depends upon their delivery of an almost impossible rate of progress; for them the fastest pace <u>is</u> the soundest. Many among their citizens know about higher standards and are unwilling to wait longer; and many of us who would help know what is possible (in a way that our forebears did not know for us), and we are eager to urge them forward. Moreover, now that a start has been made, it may well be that a rapid pace has to be maintained just to stay ahead of the expanding population. Thus, while I was in Nepal, the literacy rate was less than 5 percent and yet, with all the nation's efforts to provide more schools and teachers, literacy was <u>decreasing</u> each year.

One is tempted, nevertheless, to question the wisdom and even sometimes the safety of proceeding so rapidly. The whole thing suggests to me an attempt to present the Bonneville Power System to St. Thomas Aquinas. One wonders just what will come of it. Yet I am sure that there is no practical use in asking whether this is good or safe. These questions are not only very complicated, but also irrelevant. It is not necessary to look very far even in Nepal (which has been isolated until very recently) in order to find convincing evidence that there is no possible turning back. People who have once learned of modern antibiotics will not be willing to go back to the "unspoiled past" with its high infant mortality. The mountain villager who showed me his new kerosene lantern with pride and asked if we had anything as good as that in America will never go back to using pine torches. The man or woman who has once attended a modern school will not be the same again, nor will his village. I met a Gurung woman who knows this. She cannot read or write two words, but she contributed three thousand rupees to her village to build a school and then herself walked five days from her village to meet me and ask if we would train teachers for the school. Shall we tell her it was only an old woman's mistaken dream? Can we refuse to train teachers for her school?

No, the revolution will not be stopped. It is of no use to ask whether it should ever have started or who started it. With or without our help it will come, and it is better by far that America should be involved, for we have much of value to offer. Better to ask how we can be a constructive force in it, how we can help make of it a renaissance instead of a

new enslavement. Better for them and also better for us.

III

It is the fruits of Western technology that are most of all wanted. Everything else from America, our literature, art or "culture," could be dispensed with except only these precious apples so long forbidden. It is jeeps and tractors, hospitals and antibiotics, hydroelectric plants and refrigerators that represent the new order of civilization. It is industry (meaning wealth) and education (meaning training) which are to transform life. It is modern weapons which are to ensure national liberty and perhaps even allow a part in bigger games among the nations. Modern technology is seen as the liberator of the Western world now coming to liberate the Eastern. To be sure, there is criticism of nuclear bombs and bomb tests and a good deal of apprehension about them, but hardly anyone doubts that the less awesome products of a technological age are primary and indeed are the only primary things to be had from us. (Our interests in Asia and Africa and our fears for them are somewhat different from this view, and it is important therefore that we understand theirs.)

The costs, however, turn out to be unexpectedly high. Capital is a scarce item where the average annual income is less than $100 and the few who are wealthy would rather visit the West than bring it to the East. Where tens of millions do not have enough capital to own a pair of shoes, it is hard to promote investment, whether public or private, in expensive progress. Furthermore, the progress does not run itself and technicians brought from abroad or trained abroad are both scarce and exceedingly expensive. Fortunately, various of the more developed or most developed nations are willing "for certain reasons" (as the Indian says when he does not wish to expand on a matter) to give substantial amounts of capital and equipment and even to send trained technicians and provide training for others. Thus a start can be made.

However, this turns out to be only a beginning, a down payment, as it were, with the real and continuing payments yet to be made. Once the start has been made, of course it is hoped that the normal processes of capital accumulation and development of human resources will follow, and doubtless they will, although there is some reason to be concerned about the time required for this and also about the disruption that would attend any serious international strife. But the most serious and unexpected costs are to be measured in terms of change; the vary changes that are so much desired have negative as well as positive aspects.

The introduction of new techniques, new industries and new education into a community is certain to bring far-reaching and often unforeseen changes in working habits, in work hours, in the status within the community of new sorts of workers, and in the distribution of money and power. These soon begin to affect social structures and institutions, family patterns, leadership patterns, etc. Before long, the very cultural foundation of the community may seem to be threatened, its religion called into question, its most basic philosophies of man's relation to nature and to God, of the status of women or the training of children, altered and forced to accommodate to new pressures. Of

course, such changes took place in Western culture too under the impact there of the industrial-technological revolution, and, even spread over generations, they seemed to be very drastic. One can only imagine what their impact must be, crowded into a few years in an Indian or African village. This is the real cost of the revolution.

It sometimes happens that the changes come too quickly for even superficial accommodation. The failures that then occur seem to be superficial or even trivial, yet they can serve to indicate the difficulty with which innovation comes. In one country steel plows are introduced where previously a pointed stick had served. The farmers accept them with polite gratitude and use them as ornaments but not for plowing. Why? These plows require two hands and the farmers are accustomed to using only one, the other being used to guide the bullock. A more productive variety of rice cannot be introduced in part of Nepal where it is needed and very well suited to climate and soil because the grains cling a bit more to the stalk and a new threshing technique would need to be used. But threshing is a family or community undertaking involving social and ritual as well as mechanical activities. Running water in people's houses is not accepted because the village well is the social center as well as a source of water. Cook stoves designed to conduct smoke out of the house through a chimney are not acceptable to Hindu housewives in place of the open smoky chula now in use because religion requires that all parts of the stove (including the chimney if there is one) be cleaned after each meal. It would not be difficult to put together a large list of such minor failures nor to include in it some major ones. If these seem improbable or easily overcome, the reader might review the introduction of an innovation, say the fluoridation of water, into our own technologically highly sophisticated society. He might also consider the willingness with which Christians, out of Christian motives, will help to reduce infant mortality and disease in a distant non-Christian country and how unwilling they may then be to help control the population explosion that inevitably results.

The whole process abroad is like an attempt to transplant cut flowers. Surely the changes to be introduced need to have roots in an indigenous technological revolution that will give them continuity and relationship to a whole. In the end this means that the developing nations need to have their own scientific revolutions.

IV

Far back in the hills of Nepal, seven or eight days' walk from any contact with the modern world, iron is mined and smelted and fabricated into tools. The inhabitants of the village of Thosé who do this use almost exactly the same process of ore-smelting which is employed in similarly remote Chokwe villages in Angola, where, as a boy, I used to admire the native-made hunting knives and arrow points. It is, in fact, the same smelting process which in ancient Greece led to the development of metallurgy and eventually to the science of chemistry. The Nepalese and the Angolans have used the process for generations, perhaps for many centuries, yet there is no hint of chemistry in Thosé. The men and women who

operate the smelter know what to do, but they are not curious about the transformation that converts stone into metal. They do not depend upon any understanding of it in order to keep it going or possibly improve it. For such purposes, they use a different device; into the wall of the clay smelter is molded a small image of a deity who oversees the process and to whom deference is paid before each run.

Technology is not science. Tools and the skill to make and use them are found everywhere, but science is a unique development limited almost entirely to the Western world where it has played an essential part--perhaps the most essential part--in making possible the enormous variety of innovations that collectively make up the industrial-technological revolution. Not only has the scientific revolution given the Western world the fundamental understanding of nature that makes these innovations technically feasible, but it has also fostered an attitude toward nature and natural forces that allows for their manipulation and control. The importance of this latter condition is not often appreciated, for we live and grow up from childhood in an atmosphere saturated with science. Before entering kindergarten, our children play with "scientific" toys, hear about germs, watch television and know all about automobiles and airplanes. Third graders do "research" and their parents can scarcely buy a tube of toothpaste without resort to science. As a result, we accept a scientific, a rational view of nature without question. We take it for granted that things which are not understood will some day be understood and that in understanding natural phenomena lies the way to a better life.

Such is not the case everywhere. In Nepal, as in most of Asia and Africa, children grow to adulthood in a world that is saturated not with science but with non-science--with a deep running view of nature that is essentially non-rational, non-objective. It is a world where a cholera epidemic calls for special prayer-flags no less and no more than for immunization; where a new diesel generator for the college cannot be started after installation until a blood sacrifice has rendered it safe; where only a fool would operate a bicycle or jeep without a similar ceremonial sacrifice once each year; where the timing and conduct of every new undertaking is controlled more by astrology than by technology. The important distinction here is not one of religion as such. In both East and West religion may be a mature expression of man's search to know "that of God" in his being. It is rather a question of one's view of nature, a question as to whether nature is subject to rational understanding or not. Across the street from the principal college in Kathmandu is a wall into which is built a narrow triangular window neatly framed and decorated and provided with a small shelf of flowers. One of the professors explained to me that there is a goddess living in the field beyond the wall who likes sometimes to cross the street, and it would have been discourteous to build the wall without providing a passage for her convenience. Any Westerner visiting Kathmandu who is unable to accept this goddess as a real and influential member of the community should, in my judgment,

think of himself only as a tourist.

Science in such a setting is likely to be considered as a charm, practiced by the Westerner, but essentially qualitatively like the many older charms used to ward off misfortune or ensure good. The acceptance of science as a charm is clearly illustrated in medicine, where drugs and doctors are eagerly accepted, whereas public health measures are met with great reluctance and little if any understanding. The purifying of drinking water by boiling is more likely to be understood as a ritual purification than as biological. Once the ceremony is performed it may be considered as unimportant what happens thereafter to the water--what may be added, whether clean containers are used, etc. Thus our cook learned quickly that dishes were to be washed and rinsed in boiled water and he faithfully complied with this instruction. However, he saw nothing wrong with drying the dishes with a cloth he had just used to mop the floor and he could not understand my wife's distress when she discovered this. Even the native-born scientist frequently finds himself a practitioner of an alien cult uncomfortably suspended between two worlds and not fully accepted into either.

A true scientific revolution which could support technology would profoundly affect the cultures of the underdeveloped nations in their deepest traditions and not merely in the obvious things of roads and tractors and the like. It would be certain to bring about major changes in religious philosophy, ethics and social structure.

Surely this is playing with fire. Surely we should stop to consider before undertaking any such program.

Yet, in fact, there is little choice, for events have moved so far and so fast that some kind of technological change is now inevitable. The real questions left are only how it will come and how much disruption can be avoided. Moreover, in the change that is surely coming, very much that is good and needed can be included. If we cannot and would not prevent the growth of science in the developing nations, we can certainly help to better its coming.

In doing so, we might well allow ourselves the luxury of good planning. For reasons of our own that few thoughtful observers would defend, we have for years limited ourselves to a one-year-at-a-time program that had to be concerned primarily with the more superficial aspects of the total revolution. Now we shall soon find that five years' planning is hardly too much, as we help the developing nations with longer-range preparation for wise introduction and use of new things. We should be even more concerned than we are to help them in the improvement and development of education in all its aspects, as distinguished from simple training for specific jobs. Training will not stand long as a substitute for education. We should help, for instance, in the introduction of science in the education of children, whose fresh curiosity and unselfconscious willingness to experiment is the same the world over. We have recently developed in America new and vital approaches to secondary school science teaching which could be of enormous significance abroad. We should urge their trial and help in the considerable work of adapting them.

There is a very great opportunity to help with good science films and other teaching aids, an opportunity we have been slow to take up in our foreign aid programs. The techniques of "programmed instruction," still in the process of development in this country, might prove to have important uses in countries where there are not enough teachers and many of the existing teachers have very little training, for these techniques might speed up teacher training and can make it possible for poorly trained teachers to do a much better job than would otherwise be likely. Adaptation of these programs to children and teachers in another culture will involve much more than simple translation and in some cases they will be initially too expensive. Nevertheless, it would be worthwhile to initiate pilot studies, for the potential benefits are quite large.

At a much higher level of scientific development, while continuing and expanding the educational exchanges that have proved so valuable, we should help the developing nations solve what has become a difficult problem to many of them. This is the loss of scientists who go abroad for advanced training--often to the United States--only to find that when they have completed their degree or a period of postdoctoral study they do not wish to return to their home country, or if they do return they do not wish to stay. The research equipment back home does not compare well with what they have been using; there are few qualified scientists there with whom to collaborate; the atmosphere of the country is not conducive to scientific research; international contacts are few; publication is difficult; governments are unsympathetic; and so on. The net effect is that the less developed countries are exporting scientists to the better developed. It will take a considerable measure of international cooperation and investment to find a satisfactory solution to this problem, which, understandably enough, has not disturbed us who gain by it as much as it might.

V

Many proposals of specific foreign aid projects are being made by people who have the detailed in information that is necessary for this. I do not intend here a criticism of these projects. My purpose rather is to insist that our assistance to the developing nations, whatever its final form, must originate in clear understanding and genuine commitment. We need to have considerable understanding of ourselves as a scientifically oriented culture and of the nature of our science. We need to understand the non-scientific culture of our neighbors and to appreciate better than we now do the interaction of the two. To do so, we must place much greater reliance on our own social sciences in which we have so little faith, at least when it comes to foreign aid. It is silly for us as a scientifically mature nation to ignore our own science at just the point where it is most relevant, and we do so at our peril.

In recent months some concern for this problem has been felt by what is now named the Agency for International Development, and a small amount of research has been started to learn more about the problems connected with the introduction of change. It is to be hoped that this effort will be supported and even expanded into a serious study involving

both the social and natural sciences.

When it comes to the day-to-day business of offering assistance, we should insist upon considerable skill in communication, an indispensable attribute of the good foreign technician as of any good teacher and one which we do not emphasize enough. It is never easy to be sure one understands another exactly and is exactly understood; across real barriers of language and culture, this is exceedingly difficult and requires much sensitivity and patience. When we remember that the useful foreign aid technician is not simply an observer, but a participant who must be able to teach and to criticize, with tact certainly, but without equivocation, we cannot be surprised that he sometimes fails; but we must demand a high standard of performance and we should provide him with a high quality of training.

Anyone who has traveled into a country of unfamiliar language and culture has experienced the difficulty and frustration of partial communication and has, no doubt, seen some of the attempts at escape. Many American representatives try to escape by walling themselves off and dealing with the other country only through "official" channels. They thus limit communication to what all parties are willing to have put on the record, and that is likely to be pretty thin fare. All too often those who venture farther can deal only with people who speak English and who may then be a rather special and unrepresentative group. On the other hand, to speak and hear through an interpreter puts one at the mercy not only of his skill, but also of his understanding and good will. I spent two exhausting days once walking in the wrong direction because an interpreter correctly translated the words but not the context of my inquiry about the trail to a certain village. (It was really my fault, for I had unknowingly stated my question in such a way that the reply had to transgress either the facts or local rules of courtesy. In that country courtesy takes precedence over facts.) At another extreme are those who try to escape by "doing in Rome as the Romans do," trying thereby to demonstrate their faith in the principles of equality and brotherhood. They want to dress as the native does, eat only what the poorest peasant eats and generally live at the lowest standard that the country and their stamina permit. I respect the motive behind this, but not the judgment. To dress and live like the outcast does not make us like him in anyone's sight, nor do we thus share his joys and his sorrows. It is like limping before the crippled. No, it is better to be what we are without fraud, showing from that position that we can meet, as equals before God, all men whether high or low who share with us something of His divine spirit. I do not suppose this to be always easy to do, but it is possible.

In fact, the whole undertaking is anything but easy, and, like the other great cultural revolutions, only the future can give a true measure of its cost and significance. We who are involved in it, like climbers still ascending the mountain, find that the trail is often enough steep and that perspective has its cost. Yet the effort is necessary to our future welfare as well as to that of our neighbors and we need to give it the best that we can. In the long run, wise and effective assistance to nations that are trying

to develop their own scientific revolutions may be no less important than making our peace with automation or being first to reach the moon, for, in the long run, space-age nations and bullock-age nations make uncertain partners. In this century, even the "long run" is over before we know it.

AGENTS OF EDUCATION AND DEVELOPMENT IN NEPAL*

Hugh B. Wood

Introduction

Any discussion of education and development must be predicated on a common acceptance of the meanings applied to these terms. For the purposes of this paper, I intend the term "development" to include economic, political, and other cultural changes which lead towards a greater degree of sophistication, as displayed by the so-called "more advanced" countries of the world. I use the term "education" much more broadly than institutionally; I include any activity providing new (to the recipient) information, knowledge, and understanding, leading to behavioral and presumably cultural change.

No attempt has been made to identify all of the facets or events in the educational spectrum of Nepal during recent centuries; rather, I have selected a few of the more obvious examples of "agents of education," and have tried to analyze some of the impact these have had on Nepal's development.

The dearth of literature on Nepal has been a severe handicap to all who would study the country. My Nepal Bibliography[1] and subsequent research uncovered something less than 1700 items that had been written in western languages up to 1959 (about 10% of which has any real value). The Nepali and Indian-language literature is sparce, the Chinese writings on Nepal are very limited, and the Sanskrit manuscripts concentrate on religion and dynasty records. Hence, much of what is presented here is based on personal observation, interviews, and other experiences during a six-year period of residence in, and subsequent visits to, Nepal.

Little-Known Nepal

Geographically, Nepal extends for 550 miles east and west through the Himalayans, between India and Tibet. The northern third of the country encompasses more than a score of peaks over 24,000 feet high, but contains some inhabitable valleys. The middle third (about 40 miles wide) encompasses hundreds of small foothill valleys, surrounded by 8,000-10,000 foot ridges, and is extensively terraced for farming. The lower third of the country (about 30 miles wide) is part of the Gangetic Plains, and is the "rice bowl" of Nepal.

Nepal's 11,000,000 people are of mixed origin. Caucasian features are noticeable along the Indian border, Mongolian characteristics predominate in the north, but the majority, who live in the central valleys, are an admixture of the two races, the products, until recently, of extreme isolation. Similarly, the predominant religion of the south is

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*Paper to be presented at the IXth International Congress of Anthropological and Ethnological Sciences, Chicago, August-September, 1973.

Hinduism, of the north Buddhism, with a delightfully harmonious mix of the two through the middle valleys. Centuries have produced and supported tribalism, closely related to a caste system which, in turn, is somewhat vocational in nature. This, and geographic isolationism have produced language variations, but Nepali, the national language, is quite universal today.

Historically, Nepal until about 1750 consisted of hundreds of independent principalities, determined primarily by geography. At that time, Prithi Narayan Shah, from the small state of Ghorka in Western Nepal, undertook, successfully, to consolidate many of the independent units, and his heirs continued his efforts, and remained in power until 1846. At this time, Jung Bahadur Rana, the Prime Minister, usurped power and established an hereditary prime-ministership which lasted until 1951 when King Tribhuvan Bir Bickram Shah was able to regain power. His first actions included the solicitation of economic aid from India and America.

Politically, Nepal has experienced rapid change. Following the dictatorship of the Ranas, King Tribhuvan and his son King Mahendra made efforts during the fifties to ready the people for popular elections and party government. Following less than two years of parliamentry government (1958-60), King Mahendra dismissed the Parliament and established a "partyless" benevolent monarchy with elected, non-political advisory councils. This system obtains today under recently crowned King Birendra.

Economic development, supported by foreign aid since 1952, has made typical progress and has brought improved agriculture, institutional education, some medical facilities, road building (only 40 miles existed in 1950 in the entire country), a few bridges for the extensive trail system, air transportation, moderate industrialization, improvement in communication, tourism, increased nationalism, etc.

Finally, it should be noted that as we move northward through the country, we experience not only increasing elevations, but increasing isolation and provincialism, less development and change, greater "contentment"--in many ways we discern several distenct levels of development. The nature of these will become significant as we examine some of the agents of education.

Some Agents of Education

Education is essential to, and a product of, development. In each of the developing countries, we find agents of education that are peculiar and idigenous to one country, others that are somewhat common to all such countries, but often specific in their operation. I shall discuss several agents in each of these categories.

The Nepalese Porters. The origin of the porterage system in Nepal is hidden in the depths of history. Some of the trails, especially those leading to religious shrines, are paved with cobble-stones, and there is some evidence that some of these were constructed and/or repaired as long ago as the 7th century. For the past two centuries this national network of trails has been limited only by the lack of permanent bridges, which reduce traffic during the monsoon period.

The porterage system (which included some traders) is perhaps the first significant agent of education in Nepal. Typically, the Nepalese

villager seldom moved more than half a day's journey from his home; perhaps once or twice during his lifetime he would visit a shrine two or three days away. This has changed today to extend his mobility to perhaps a full day's journey as his perimeter, and to increase the number of exceptions--those travelling to the capital or other centers, or to other countries, or leaving their village permanently for more exciting and challenging centers.

Thus, the villagers have traditionally relied on the porters for information from the "outside world." They have been a significant agent of education, carrying information from village to village about improved methods of farming, of building fire pots and designing roofs, on weaving and dyeing, etc. They first brought the news of the sewing machine as it swept northward, and then brought the machine itself. The porters brought the first cigarettes and kerosene to the villages, and more recently cheap Japanese cotton cloth. Information stimulated desire, desire led to increased production to buy the product.

During my residence in Nepal, I witnessed an interesting transformation of the porterage pattern in western Nepal. For many years, cigarettes and kerosene were transported by porters from an Indian railhead at Nepalgunj; northward forty miles to Pokhara. In 1956 freighter plane service was inaugurated for this area. Transportation costs were halved, quantity was quadrupled. Many were concerned about the porters who were now out of work; but the concern was needless. The porters moved to Pokhara, doubled their number, and fanned out to the east, the north, and the west from Pokhara to extend the "advantages of civilization"--cigarettes and kerosene--to many new villages. Incidentally they provided these new villages with an agent of education.

Porters also carried news of political events, catastrophes, and even world happenings. But to the simple villager, this news was of less importance than legends and had little, if any, effect on his way of life.

Thus, the porter became a significant agent of education for many simple, local cultural changes in the village, and remains so today, especially in the more remote villages where more recent agents of education have not penetrated.

The Gurkha Soldier. The Gurkha soldier since the mid-1800's has been a most important agent of education. Informally at first, and later through formalized enlistment, he served in the British army where he received the equivalent of an eighth grade education and, more recently, some severance vocational training. He had the opportunity to "rub" against western civilization, both in his contact with the British soldier and later through service in western countries. He absorbed not only formal "learning," but often some of the westerner's concepts of human relationships.

During his twenty-year enlistment, he usually returned to his village several times, but his real impact began when he returned for "retirement" at about the age of 37. He commanded respect and attention. His pension provided financial independence. During his early years of retirement, he found pleasure in tutoring some of the youth of the village. (Institutional education was virtu-

ally unknown outside the Kathmandu Valley and along the Indian border before 1950.)

He, like the porter, brought new ideas and knowledge relative to agriculture, health, cooking, etc. to the village. But, as he became older, his status was enhanced and he was permitted to challenge age-old concepts and beliefs. He often chided tradition, and for the first time in the village's existence, made inroads into time-worm beliefs, and created interest and concern for national, if not international events.

As India moved inexorably towards independence during the second quarter of the century, the Gurkha soldier carried support for this movement into the middle and northern hinterlands and prepared these areas for acceptance of Nepal's own revolution in 1950-51 which overthrew the Ranacracy and restored power to the throne.

The "Rub of Culture." Frances Dart has dealt with the "rub of culture" in Nepal at some length.[2] This agent of education operated along the Indian border quite extensively, especially after the arrival of the British in India, and with political significance during India's struggle for independence.

This was augumented by several factors. Much of the border area was cut off from the rest of Nepal by uninhabitable malaria-infested swamps. There is no natural border and thus an ethnic overlap in both directions. Trade is oriented to the south rather than to the north.

Thus, Indian beliefs, customs, and traditions were bound to rub off on the neighboring Nepalese. These were carried northward by visits to shrines and occassionally relatives, and business and political trips to Kathmandu and district headquarters in the mid-lands. It was in this border area of Nepal that the Nepali Congress Party came to life, flowered and eventually led the revolutionary activities. (The proximity to the "escape hatch"--India--also undoubtedly prompted the party leaders to base their operations here.)

It has frequently been said that "the Nepalese along the Indian border are more like Indians than Nepalese." The same might be said about the likeness of the northern Nepalese to the Tibetans. In general, however, the political allegiance is to Kathmandu. But the effect of "cultural rub" is strong on both borders.

Religious Institutions. Religion and its formal institutions in Nepal seem to have been rather innocuous as agents of education and are mentioned here more as exceptions than as models. The presence of two strong religions in the central valleys has, of course, affected the culture of these people, but change attributable to religion has been very slow. Modification of the two religions here has been comparatively sharp--sharing of dieties, approval of meat consumption (perhaps because of climatic necessity), religious customs relating to birth, marriage, and death, etc.

However, two formal institutions associated with religion have failed to produce significant change. For centuries, the Buddhists have supported "gompas," or organized "schools" to provide several years of training in prayer-reading to at least one male youth in each Buddhist family. Because the curriculum was confined to the skill of

reading and the content of prayers, there appears to have been no substantial change in the institution, or resulting cultural change over the many centuries of the existance of these gompas. (It is believed that there were about 50 of these "schools" scattered throughout Nepal in 1952).

A second institution, much more formal and extensive, and probably as old, was the Sanskrit education system, which included "primary schools," "secondary schools," and a "college." The purpose of the system was to train Sanskrit scholars who could copy, read, and interpret the thousands of Sanskrit manuscripts available in shrines and libraries throughout the country. Until about 1960, the curriculum was confined rigidly to Sanskrit studies, but the system has expanded and become part of the present educational system, and has added Nepali language, Nepali history, and some arithmetic to its curriculum. Here again, however, the rigid, narrow curriculum and the self-centered interests of the participants were not conducive to change, and contributed little, if anything, to cultural change.

Foreign Visitors. The geography of Nepal, and its politics up to 1956 have discouraged foreign visitors. Missionaries travelling to and from Lhasa in the 7th century were told to "move on." Prior to the Rana regime, Nepal was inhospitable, to say the least, to the "foreigner"; the British, following a two-year war, 1814-1816, demanded a residency in Kathmandu, but didn't really achieve this until 1848. By this time the Rana dictators had assumed power and formally declared the country closed to all foreigners. Exceptions to this rule were the Tibetan traders and porters, Indians (if they did not impose), and individual British "residents," the latter being confined to the Kathmandu Valley and usually under escort to and from the Indian border when such travel was necessary. With rare other exceptions--e.g. a Swiss engineer to build a power plant, visiting royalty to hunt in the Terai--Nepal had no foreign visitors until the advent of economic aid beginning in 1951-52 and the arrival of the first tourists in 1956.

In spite of these limitations, however, the early British residents had a significant impact, especially in the Kathmandu Valley. The ruling Ranas were greatly impressed with the British achievements in India and aped their customs and achievements in many ways. With considerable encouragment from the British (for obvious political reasons), the Ranas:

(1) Visited European capitals and brought back "curios of civilization," including such knick-knacks as crystal grandfather clocks, crystal chandeliers, "Coney-Island" curved mirrors to distort the viewer's features to the ammusement of all, and primitive plumbing for their palaces.

(2) Sent their youth to British schools in India, and later established a British-type school and college in Kathmandu for their own children. (Education was forbidden, under penalty, to others.)

(3) Encouraged the youth of Nepal to join the British army and later formalized British recruitment of the Gurkhas.

(4) Adopted many British trappings of govern-

ment: courts, taxation, protocol, etc. if they did not interfere with authoritarinism).

(5) Learned English (English was the instructional medium in the Rana schools), purchased English books for their personal libraries, adopted many English customs, abolished slavery (1926), Anglicized their trade and businesses, etc.

The cultural, political, and economic changes resulting from this foreign contact were largely confined to the Kathmandu Valley, and many specifically to the Rana families, which, nevertheless, constituted the power structure and thus a potential force in Nepal's future.

As noted above, other agents of education interfered to change the course of history, and since 1952 there have been hundreds of technical experts with access to most parts of the country,[3] and since 1956, thousands of tourists with access to several of the more populated areas. The impact of these foreigners has followed the pattern found in most developing countries.

The "Trappings" of Development. While the agents of education noted above have continued to effect change, modern gadgetry has been introduced, mostly since 1952, to effect even more change. True, the earlier agents helped to set the climate for acceptance, yes, even desire, for these new gadgets, but conceptualize, if you will, the impact of:

(1) Air transportation, now serving some fourteen areas throughout Nepal, and reducing the distance to the capital and India from up to thirty days to less than one day for much of the population, five days at the extreme for all but a few of the others.

(2) A north-south all-weather highway from the Indian border to the Tibetan border, and major sectors of an east-west road now available, with military and political implications as well as severe cultural change for those who live adjacent to the new roads, and economic changes for many others.

(3) Radio services, including news and educational programs, telephone and other communication services and newspapers, expanding rapidly throughout the country, and the increasing availability of international intelligence from Indian radio stations and newspapers.

(4) Institutional education through 7500 primary schools, 1100 secondary schools and 50 higher schools (1972) reaching into every corner of the country, providing not only learning for youth but also adult education, first aid and similar community services.

(5) Similar services in agriculture, health, business, industry, government (taxation, judiciary, planning), and the usual facets of development.

Nepal as a Model for Study

The development economist finds Nepal a neat model for study and analysis partly because isolation has served to sharpen the delineation of "periods" in economic development, and partly because of the existing "levels" of development

which may be used for comparison and contrast. I should think that the anthropologist would find equally fertile ground for study, for similar reasons.

As an educational program design specialist, I found a unique situation in 1953 when I was asked to assist in the development of an educational system for Nepal. Nearly all other developing countries had been saddled with European school systems, and immediately upon gaining independence have begun a "band-aid" process of trying to adapt a foreign system to their needs. An inventory of schools in Nepal in 1952 revealed (a) about 50 "gompas," (b) a Sanskrit system including a few primary schools, three secondary schools, and a college, (c) a British system for the Ranas and a few other elite, which included a few primary schools, three high schools, and a college, (d) an increasing number (perhaps 100) of vernacular schools near the Indian border (prototypes of Indian prototypes of British schools, but in the local language), and (e) a few "Basic" schools (prototypes of Ghandi's indigenous schools in India) in the process of being organized. The number of high school graduates in all of Nepal, including those who had gone to India for schooling, was about 1,000; of college graduates, about 300. Less than one percent of the population was in school.

Here was an ideal opportunity for a nation to design and develop a school system truly indigenous to the needs of its people. In effect, it was so designed,[4] and it is developing to a major extent along these lines.[5] However, it is not difficult to discern some of the obstacles to the full realization of such a dream.

First, the majority of the educational elite who designed the program were products of the British system, either the Rana sponsored schools or the British schools of India. In spite of this, the design came out as an indigenous system.

Second, and more important, while the plan immediately won the "King's Seal," and the general support of the populace, the popular support was for "my neighbor's children; mine must have the 'superior' English education." Ability to speak English (available in the new national high schools, but not primary schools) represented "educational success," and English language soon found its way into the primary schools, to displace the more practical, less academic parts of the curriculum.

Third, although the teacher training program included learning the content of the new curriculum of the primary and secondary schools, teachers, especially when crowded, tended to slight the content which they had not experienced as youth and emphasize those aspects which would insure successful advancement through college, so often conceived as the true index of their own success.

Fourth, the two concepts of "voluntary terminal points in education prior to college graduation" and "training for a vocation" were totally incomprehensible to the populace--certainly inconceivable for one's own children!

So, the most recent report on education in Nepal[6] continues to chide the populace for straying from the original design, and makes recommendations for returning education to manpower needs and other national goals. The first two decades of new institutionalized mass education in Nepal has been more indigenous than in most other developing countries--

and it will be worthwhile for the economist, *anthropologist*, and educator to note the effects of this, if any, in their respective fields--but it has been, and will continue to be, a struggle to keep it indigenous.

The Conflict Between Integration and Uniqueness

In spite of Nepal's historic freedom from colonization and imperialism, she is caught up in the conflict between "trying to become like the Western World" and "retaining her uniqueness." Traditionally, we have assumed that integration ("making others like us") is essential to harmony. More recently, we have asked whether "co-existence" could not become something "beautiful" and harmonious.

Both nations and races need to examine this possibility. Paulo Freire, in his Pedagogy of the Oppressed, points out that, "There is no such thing as a neutral educational process. Education either functions as an instrument which is used to facilitate the integration of the younger generation into the logic of the present system and bring about conformity to it, or it becomes the 'practice of freedom,' the means by which men and women deal critically and creatively with reality and discover how to participate in the transformation of their world.... As long as they (the oppressed) live in the duality in which to be is to be like, and to be like is to be like the oppressor, this contribution (self-liberation) is impossible." (Freire, 1972, p. 15). Obviously, an indigenous educational system, not a transplanted one, is essential to "the practice of freedom," the maintenance of uniqueness.

But if Nepal successfully adopts this stance in education, can she be sure of finding a world receptive to this notion of unintegrated, lovely co-existence? The process of creating a new national ideology, of rediscovering the earlier uniquenesses of the culture that reflect the true national character and aspirations of the people, and the resocialization necessary to achieve this unique and indigenous status, may be too much to expect of Nepal, especially in view of the uncertainty of world-wide acceptance.

Ernest Shanahan points out that, "In order to mobilize the masses of people to promote social and economic development, the specificity of the heritage must be stressed, thus creating the necessity for a particularist curriculum in the country." (Shanahan, 1972, p. 11). On the other hand, Clignet emphasizes that, "This mobilization is only an indispensable tool for enhancing and accelerating the overall level of economic and political achievement of the entire social system and for making it more competitive in international deals and bargains." This necessitates a universalist curriculum. He goes on to emphasize that, the leaders of these countries ". . . must choose between the formation of a particularist elite with deep roots in . . . the local society or the formation of a universalist elite able to converse and compete freely with their counterparts. . ." in other countries of the world (Clignet, 1971, p. 309). The existence of foreign technicians, educators, and advisors, ignorant of the demands of the local history, pretty well guarantee the latter course of events.

As it stands today, agents of education, including some of the schools, are contributing

to the development of a universalist elite who are primarily concerned with directing the country's economic and political development. In the hinterlands, there is some evidence that the masses will cling to the particularist concept; and this possibility is supported by a strong set of "conservatives" in the populated centers who strongly defend traditional institutions and customs. Can a people compromise this dicotomy in this fashion for a significantly long period? In Nepal, time will tell.

Footnotes

[1]Wood, Hugh B. Nepal Bibliography. Kathmandu: College of Education Press, and Oceanside, Oregon: The American Nepal Education Foundation, 1959. 108 p.

[2]Dart, Frances. The Rub of Culture. Foreign Affairs 41:360-74, January, 1963.

[3]Though perhaps not "technical experts" in the strict sense, the Peace Corpsmen who are included in this category, have had special impact because of (a) their large number, (b) their actual residence "amoung the people," (c) their wide range of interest and activity, and (d) their competence in the native language.

[4]Pandey, Pudra Raj: Bahadur, Kaiser: and Wood, Hugh B. (Eds.). Education in Nepal; Report of the National Education Planning Commission. Kathmandu: Bureau of Publications, College of Education, 1956. 259 p. (mimeo, 1954). (English and Nepali editions.)

[5]As several interim reports and observations reveal. See, as examples:

(a) Various issues of the Education Quarterly, published since 1957 by the College of Education, Kathmandu.

(b) "Symposium: Educational Progress in Nepal." Education Quarterly 3:1-77, June-September, 1959.

(c) Wood, Hugh B. Six Years of Educational Progress in Nepal. Kathmandu: Bureau of Publications, College of Education, 1959. 76 p.

(d) [Sharma, Kulashekar] Primary Education in Nepal. Kathmandu: Ministry of Education, His Majesty's Government, 1962. 11 p.

(e) Wood, Hugh B., and Knall, Bruno. Educational Planning in Nepal and its Economic Implications. Paris: UNESCO, 1962. 143 + 38 p. (Mimeo)

(f) Uppaity, Trailokya Nath. Financing Elementary Education in Nepal. Oceanside, Oregon: The American Nepal Education Foundation, 1962. 330 p.

(g) The National Education System Plan for 1971-76, Nepal. Kathmandu: Ministry of Education, His Majesty's Government of Nepal, 1971. 83 + x p.

[6](g), immediately above.

References

Cligner, Remi. Damned If You Do; Damned If You Don't: The Dilemma of Colonizer - Colonized Relations. Comparative Education Review 15: 296-312.

Dart, Frances. The Rub of Culture. Foreign Affairs 41:360-74.

Freire, Paulo. Pedagogy of the Oppressed. New York: Herder and Herder.

The National Education System Plan for 1971-76, Nepal. Kathmandu: Ministry of Education.

Pandey, Rudra Paj: Bahadur, Kaiser; and Wood, Hugh B. Editors. Education in Nepal; Report of the National Education Planning Commission. Kathmandu: Bureau of Publications, College of Education.

Primary Education in Nepal. Kathmandu: Ministry of Education.

Shanahan, Ernest J. Education and Nationalism. unpublished paper.

Symposium: Educational Progress in Nepal. Educational Quarterly (Nepal) 3:1-77.

Upraity, Trailakya Nath. Financing Elementary Education in Nepal. Oceanside, Oregon: The American-Nepal Education Foundation.

Wood, Hugh B. Nepal Bibliography. Oceanside, Oregon: The American-Nepal Education Foundation.

Wood, Hugh B. Six Years of Educational Progress in Nepal. Kathmandu: Bureau of Publications, College of Education.

Wood, Hugh B., and Bruno Knall. Educational Planning in Nepal and its Economic Implications. Paris: UNESCO.

CROSS-CULTURAL TEACHING OF SCIENCE*

Francis E. Dart
and
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A major theme of our age is the development of science and technology in societies around the world. Leaders in most of the developing countries of Asia, Africa, and South America, where knowledge and utilization of natural resources have remained nearly static over the past several centuries, now recognize that they must move into the era of applied science and technology if provision is to be made for the needs of increasing populations and for improved standards of living.[1] Thus, technology and science are emphasized in their development plans and in the assistance they seek and receive from nations such as the United States.[2] It is generally assumed that this process of scientific and technological development will require very much less time in Asia, Africa, and South America than it did in Europe and North America, and in fact many countries hope to achieve in one or two generations changes comparable to those that occurred in the West over 2 or 3 centuries. Their hope is based partly upon the availability of capital assistance from the industrial nations and partly upon the ease and rapidity with which knowledge now at hand can be communicated--knowledge which was originally obtained over a long period in a process involving many errors and confusions that will not have to be repeated. In their optimism they largely ignore the profound social and cultural changes that accompanied the Western development and the social and cultural changes that must accompany this new scientific revolution. Frequently it is found that a country whose leaders are determined to introduce rapid change is not ready to adopt modes of thought and organization that are fundamental to an advancing science and technology, and hoped-for results have been slow to materialize. It should be added that unnecessary ambiguity has sometimes resulted from a failure, in discussions such as this one, to distinguish between technology and science.[3] In what follows we are concerned specifically with science and with problems associated with its introduction.

The difficulties encountered frequently relate to the very nature of the interaction between Western science and non-Western cultures, an interaction that has received little study in spite of the fact that it lies at the very heart of the development process. Western technology developed out of the Western scientific revolution, which, over the last 3 centuries, has profoundly altered Western man's understanding of, and relation to, nature. The resulting "scientific viewpoint" has become our way of considering reality, and it is so much a part of us that it is taken for granted. The traditional cultures of Asia or Africa, however, are frequently nonscientific--nonrational in their approach to nature--and they do not always provide a ready

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foundation upon which to build a more scientific view. Of course people of all cultures experience many of the same familiar phenomena of nature and feel that they understand what is real and how knowledge about the real world is to be organized. Interpretations of what is meant by the "real" world, however, vary widely. Major tasks, then, are to determine what constitutes reality for persons of different cultures and to learn how the most meaningful communication about nature can be established among people holding different views of reality. The first of these tasks has been undertaken, with particular attention to science, by Malinowski,[4] Hsu,[5] and others,[6] but our knowledge is far from complete; the second has hardly been touched on, except as it relates to science education within the Western countries.

Science education, in any country, is certainly a systematic and sustained attempt at communication about nature between a scientific and a nonscientific, or a partially scientific, community, and as such it should be particularly sensitive to the attitudes and presuppositions of both the scientist and the student. In fact, however, the teaching of science is often singularly insensitive to the intellectual environment of the students, particularly so in the developing countries, where the science courses usually offered were developed in a foreign country and have undergone little if any modification in the process of export. Why should we suppose that a program of instruction in botany, say, which is well designed for British children, familiar with an English countryside and English ways of thinking and writing, will prove equally effective for boys and girls in a Malayan village? It is not merely that the plants and their ecology are different in Malaya; more important is the fact that the children and their ecology are also different.

We are convinced that a study of the intellectual environment in which children live can lead to significant improvements in science teaching and science learning. This is of particular importance, moreover, to the developing countries whose environments are very different from those of the West and whose educational resources are so limited as to make any increase in efficiency very desirable. We discuss in this article an initial effort in that direction, some pilot experiments conducted in Nepal during October and November of 1965.

Experimental Setting and Procedure

Nepal and its people remained effectively isolated from Western intervention or education throughout the entire colonial period of European influence in Asia, the only important exception being the Gurkha mercenary soldiers who returned to their villages after a period of service in the British army, bringing with them the accumulated experiences of several years of travel and contact with foreign places and ideas. Only within the last dozen years has there been any opportunity for Western education or science to reach appreciable numbers of Nepalese communities, and there is now a considerable range in the degree to which they have penetrated into village life and thought. The government is actively supporting the development of education, as to both quantity and quality, through increase in the number of schools, establishment of a modern

teachers college, development of a national university, and other measures. These circumstances, together with the practical consideration that one of us (P.L.P.) is a native of the country, with knowledge of the language and customs, dictated our choice of Nepal for our investigations. (It should be added that each of us has spent several years living and working in the other's native country.)

We decided to investigate three widely separated ethnic communities having quite different histories of outside contact: the Newars of the Kathmandu Valley, the Limbus of eastern Nepal, and the Gurungs and Chhetris in the west of Nepal. The sacrifice in depth which this decision entails is justified by a need, at least at this early stage, to determine how widely applicable our conclusions might be. The Newars have, for many centuries, been the principal inhabitants of the Kathmandu Valley, where they have developed a rich artistic and literary heritage. They include many skillful artisans and enterprising merchants within a predominantly agricultural economy. They are conservative, adhering rigidly to an inclusive, self-consistent social and philosophical orthodoxy. The Newar town of Panga, where we worked, is a closely packed unit of narrow paved streets and three-story brick houses surrounded by fertile rice fields. Many of its citizens make frequent trips to Kathmandu, the cosmopolitan capital no more than 8 kilometers away, and some of them work there regularly, yet Panga is in most respects an island which might just as well be 500 kilometers or 5 centuries away. Its people are shy, friendly, and hospitable to strangers, but they express little curiosity about a visitor's thoughts. The town has both primary and secondary schools with trained teachers, but fewer than one-fourth of its school-age children attend school.

In contrast, the Limbu village of Tokma is several days' walk from any motor road, airfield, or city. Its dwellings are scattered widely over a large and fertile hillside, which provides ample income to the inhabitants, all of whom live by farming. There is no school or store or other business establishment in the village itself. The villagers have the reputation, shared by all Limbus, of being proud, quick to anger, and fiercely independent. They have resisted political domination, and they take pride in an independence of mind which resists the importation of orthodoxies from outside. Their religious life combines Hinduism with shamanism and witchcraft, and they maintain unique customs not shared by other Hindus.[7] They are reserved and suspicious of visitors but not hostile, adhering carefully to established rules of courtesy.

Finally the Chhetri and Gurung people of Armala Dihi are open, friendly, and relatively poor farmers who will sit for hours asking questions about a stranger's experiences and opinions and about the world he comes from. Many Chhetri men serve as Gurkha soldiers, and nearly every village has one or more members who have returned from such service to live in retirement as respected and influential citizens whose pension payments add significantly to the economic well-being of the village. In Armala Dihi there is a small primary school but no store. There is a good

middle school about an hour's walk away. Whereas in Tokma we were the guests of a wealthy Limbu landowner for several days without once being invited to enter his house, our host in Armala Dihi insisted that we move into his own room, sleep in his own bed, share his meals, and use the best of everything he could provide.

We sought information about attitudes toward familiar phenomena of nature, and about the sources of knowledge about nature, through interviews with school-age children, typically 9 to 14 years old, and with adults of an age to be these children's parents. The interviewing was kept informal and usually involved small groups of three or four individuals at a time. The main content and order of the interviews was held constant for all groups.

The questions were of three types, designed to reveal (i) how the respondents accounted for various commonly experienced phenomena, such as rain, lightning, thunder, fire, and earthquake; (ii) what attitudes the respondents held about the control or manipulation of such phenomena; (iii) what were considered to be the origins of knowledge about nature, and what the accepted criteria of validity of such knowledge were. Typical questions are as follows.

Category i. How do you account for rain? Where does the rainwater originate? What do most people in the village think about rain? What makes an earthquake?

Category ii. How can rainfall be brought about or prevented? Is it appropriate for men to influence the rain? Is there any protection against lightning or thunder?

Category iii. How were these things (about rain, and so on) learned? How does one know if they are true? How might new knowledge about such things be obtained?

In addition, observations were made of the kinds of opportunities available to children for learning and practicing skills of abstraction and manipulation that could later be a help in learning and using science. As a test of ability to represent real situations by means of an abstract model, each respondent was asked to sketch a rough map showing how to get from his house to the school.

For comparison, similar groups of American primary school children, aged 9 to 12, attending the University of Hawaii Elementary School in Honolulu, were interviewed and asked to sketch maps. About half of these children were Caucasian, the others being of Asian and Polynesian origin. All had been brought up in Hawaii among typically Western surroundings of American games and toys, American magazines and television programs, and all the great diversity of intellectual and physical stimuli to be found in a city such as Honolulu.

The Nature of Phenomena

Throughout the interviews, in both Nepal and Hawaii, our interest was directed not toward the "correctness" of a response, as judged by accepted scientific or other standards, but rather toward the type of the response itself and the relation to nature that it suggests--whether, that is, it suggests an explanation of phenomena that is mechanistic, supernatural, teleological, and so on. If a given statement can be recognized as referring

to a certain religious belief, for example, that recognition serves our purpose, and we are not concerned with whether or not the pertinent religious scripture is accurately quoted or even explicitly referred to.

With very few exceptions we were given both a "folk-oriented" or "myth-oriented" and a "school-oriented" explanation of a given phenomenon within a single interview, sometimes by a single individual. Thus, to account for earthquakes, one of a group of four Chhetri boys said, "The earth is supported on the back of a fish. When the fish grows tired it shifts the weight, and this shakes the earth."

All agreed, but another added, "There is fire at the center of the earth. It seeks to escape and sometimes cracks the earth, causing an earthquake." All agreed to this as well.

In a group of Newar school children (four boys and a girl) these statements were given in answer to the same question:

"The earth is supported by four elephants. When one of them shifts the weight to another shoulder an earthquake results."

"There are fire and molten metal inside the earth which try to escape. They may crack or move the rock of the earth, causing an earthquake."

Again all agreed to both statements.

This pattern is repeated again and again:

"The deities break vessels of water in the sky, causing rain."

"The sun evaporates water from the sea, producing vapor which is cooled by the mountains to make clouds and rain."

"Lightning comes from the bangles of Indra's dancers."

"Lightning comes from the collision of clouds."

"It rains only in the summer (Monsoon) season because we need the rain then. In winter we do not need rain."

"It rains in the summer because the sun is hotter then and causes more evaporation."

The replies given by Newars, Limbus, and Chhetris are very similar in content, evidently reflecting a common background of mythology and of school curricula, a similarity which is not very surprising, for the three groups, with all their differences, do in fact have a common school system and, in the main, a common religion. More surprising is the fact that each group nearly always gave answers of both the types illustrated above, and that all the members generally accepted both. Of course there is nothing unusual in the thought that a given phenomenon may result from either of two different causes and hence that, in general, each of these causes may be accepted as potentially valid. However, here the two types of "causes" offered appear to be qualitatively so different as to be mutually incompatible, for they suggest conceptually very different ideas of nature. Examination of the replies quoted shows that they do not admit of the type of synthesis which states, "God is the source of rain. He produces rain by causing the heat of the sun to evaporate water from the sea. . . ." It is as difficult for us to accept both as real alternatives as it is to accept them as simulta-

neously true.

The contradiction is far more apparent to us, however, than to our respondents, who showed no discomfort over it, a fact which should serve to warn the science educator that all is not as it appears on the surface. The philosophies and literature of Asia make great use of paradox, and, to Asians, contradiction may be more intriguing than disturbing. We should not therefore, discount the possible existence of very deep-rooted patterns of thought not consonant with the "either-or" logic underlying Western science, the logic which makes it so difficult, for instance, for American students to accept the concept of complementarity in modern physics. However, a simpler explanation should also be considered. Much of the teaching and learning in Nepalese schools involves rote memory only and demands very little understanding or conceptualization. Furthermore, many of the teachers and textbook writers belong to the Brahman caste, the priestly class traditionally responsible for the teaching and preservation of orthodox religious beliefs and practices. It is quite possible that, even without any conscious intent on their part, these teachers and textbook writers have taught early "scientific" concepts in such a way as to produce, in combination with a tradition-oriented home environment, a dual view, according to which distinction between myth and science is unnecessary. Even in science teaching in an American elementary school the amount of teleology used is not inconsiderable. In any case, this dual view of nature is a matter that needs to be considered in the planning of revised science teaching methods.

No such duality was evident concerning the control or manipulation of nature (which was always considered appropriate although not always possible). To questions such as, How can rainfall be brought about or prevented? or, Is there any protection against thunder (lightning)?, a single type of reply was always given. Usually control of such natural phenomena is expected to follow from a religious ritual in which it is made explicit that actual control is at the will of a deity who may not always respond. Thus control is uncertain. In some instances, as when the farmers want hail deflected away from crops, the resort is to magic or charms performed by special persons and not associated with a religious ceremony. Charms too may fail, and all such procedures remain ambiguous enough in principle to make convincing empirical tests of their validity hard to manage. Of course there are many common and well-understood technological manipulations of nature which are taken for granted and explained in operational terms. Such is the case, for example, with irrigation, the cooking of food, or the firing of clay vessels.

In no single instance did a member of any one of the groups of Honolulu school children manifest a comparable duality of viewpoint. The explanations offered in answer to the same questions about rain, lightning, and so on were not always factually correct, but they were always "scientific" in concept and usually mechanical. Lightning is produced "when two clouds collide"; the heat of the sun evaporates and "lifts" water up to make rain; parts of the

earth "shift," causing earthquakes, and so on. On two occasions the Biblical story of God erecting the rainbow as a promise to the children of Israel was mentioned, and each time the respondent spontaneously pointed out that this is a different kind of statement and not an explanation of rainbows.

None of the members of the comparison groups in Honolulu believed that control or manipulation of natural phenomena of the kinds under consideration was achievable through magical or religious practices; they considered such control either achievable through technological procedures or impossible. Many, but not all, of the individuals who said control was impossible suggested that it might in time become possible. Sometimes procedures were described which are not used and would not work, such as the use of lightning rods to convert lightning into ordinary house current, but even these procedures were always presented as scientific, technological processes without any occult or supernatural element.

The Nature of Knowledge

When our Nepalese respondents were asked to give the source of their knowledge about nature they invariably said that it came "from books" and "from old people." When we asked how the old people found out or how knowledge got into the books they told us it came from earlier generations of "old people" or from other books. When we pressed for some ultimate source, most of our respondents said that these things had always been known, although a few of them referred to legends telling how some particular skill, such as fire building, was given to men by the deities. One Chhetri student suggested that some knowledge might have been obtained by "accidental observations."

We went on to inquire how knowledge hitherto unknown to anyone might be acquired or how it might be sought. We were always told that such new knowledge is not to be expected. Even when we pushed this question so far as to call attention to such "new" discoveries as space travel or transistor radios, which all Nepalese know about, it was held that such things were always known by someone, or else that these are merely new applications of old knowledge. One very tenative exception was offered by a Limbu boy, who suggested that really new knowledge might sometimes come through dreams. We find it hard to believe that more probing would not reveal other exceptions, yet the predominant view is one that pictures human knowledge about nature as a closed body, rarely if ever capable of extension, which is passed down from teacher to student and from generation to generation. Its source is authority, not observation. In fact, experiment or observation was never directly suggested to us as an appropriate or trustworthy criterion of the validity of a statement, or as its source. When one of us stated that a book, after all, is only a more permanent record of someone's observations, the idea was treated as novel and faintly suspect. Given this concept of knowledge, it is no surprise that the schools rely heavily upon rote memory. Memorizing would seem to be the easiest and most efficient way to deal with a closed and limited body of unvarying facts. There are also other well-known and

frequently criticized forces embedded within the formal educational system which strongly reinforce this natural tendency.

It should not be thought, of course, that it is only in Nepal or Asia that students try to learn science by memorizing. Our comparison group in Honolulu showed evidence of considerable, though more limited, reliance on the memorizing of facts given in a book or stated by a teacher. However, members of the Honolulu group all stated that the knowledge originated in observation and experiment, and they believed that new knowledge not only can be obtained but continuously is being obtained.

Use of Abstractions

Science as the scientist thinks of it and would like to see it taught consists, not of a body of more or less isolated facts to be memorized, but of a system of empirically verifiable relationships between more or less abstract concepts. While the concepts are derived from real phenomena, the relationships of science relate concepts, not real objects, and the theories of science are built around "models" which portray in abstract, often mathematical, terms a selectively idealized representation of real phenomena. It is essential for the science student to learn to be at home, at some level of sophistication, with this process, which must surely appear even to the Western layman to be extraordinarily indirect. Much attention is given to this in the recently developed or improved science courses in the United States, which go to great lengths to give students systematic training and practice in skills of abstraction and inference while striving to maintain contact with the real world by subjecting conclusions to observational verification. Of course, informal learning plays a part in this process. The toys children manipulate, the games they play, the activities of the adults they watch and imitate, the conversations they listen to all contribute to the attitudes and skills they develop.[8] In everything the child does in school there is an echo of his environment at home.

How much more difficult science must be, then, for a child who lives in a Nepalese village or small town, immersed in a very different environment with its own pervasive non-Western influences. Here he lives close to nature in a direct, particularistic relation of planting and harvesting, with little or no abstraction and little need to generalize. He does not play with mechanical toys or build mechanical models; he plays or watches games of skill or chance but knows little about games of strategy; he rarely sees a book in his home; he rarely has occasion or opportunity to deal with derived or inferred properties or concepts. Certainly his society, or any society, contains a great many abstractions, ranging from spoken or written language all the way to a very complex religious cosmology, but these are not all particularly useful in preparing the way for science, which wants to hold to a rather special and verifiable relation to nature. Thus, for example, every Nepalese child will be familiar with abstract representations of certain Hindu or Buddhist deities and heroes of religious myths and legends, yet these are not subject to direct or even indirect observational verification, after the

manner of science, and they may not be conducive to a scientific approach.

A thorough analysis of the informal intellectual environment, even in one of the groups we visited, would be a major undertaking which we did not have the resources to undertake. Yet we did want to include some tentative assessment of the effects of informal learning as it might bear upon science learning. For this purpose we asked our subjects to sketch rough free-hand maps showing how to get "from your house to the school" (or to some other well-known landmark). A map is a fairly simple, yet typical, example of a scientific model. It preserves a varifiable 1-to-1 relation to reality and yet it is an abstraction, useful for what is omitted no less than for what is included. Mapping allows for great variety in the way a given reality is represented, and the relationships and inferences derived from a map, while not totally unrelated to reality, nevertheless actually refer to the model and not to the real world. We believe that the maps which children[9] or adults draw to represent a well-known route or neighborhood will reveal with some accuracy their readiness to understand and use other scientific abstractions.

Fig. 1. Map drawn by a 15-year-old Limbu boy to show the way from his house to the school. In fact, the house and school are not on the same street or path.

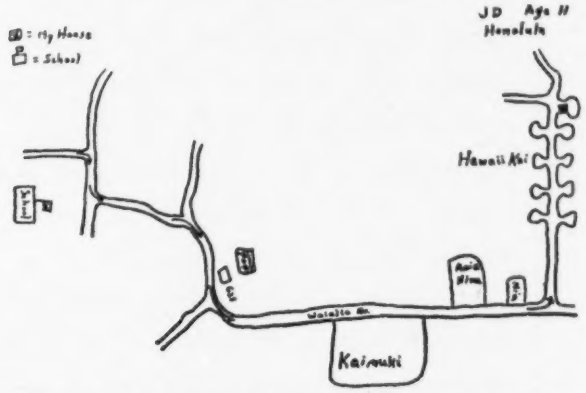

Fig. 2. Map drawn by an 11-year-old American boy to show the way from his house to the school. Note the wealth of spatial and directional clues.

The "maps" we obtained from the Nepalese respondents are all very similar to each other and to the example shown in Fig. 1. Always they include a recognizable picture of "my house" and of "the school," the two being connected by a line which seems to denote the process of going from one to the other, not the spatial relationship of one to the other. Thus, the two buildings represented in Fig. 1 are not in fact on the same street or path, being separated by several street intersections and other landmarks, none of which appear on the map. In contrast we show (Fig. 2) a map typical of those drawn by American children in response to the same instructions. Here both house and school are represented by abstract symbols, not pictures, and there is a clear effort to show spatial relationships and to provide needed spatial clues. The propensity of the Nepalese for making maps (whether verbal or graphic) which are sequential rather than spatial constructs is not limited to school children. In a land of foot trails, where literacy is too low to justify the use of signs, this propensity has been a source of consternation to more than a few travelers of Western upbringing! We, too, in reply to

our inquiries as we traveled, were given instructions or "maps" which, like a string of beads, list in correct sequence the places we should pass through without giving any clue as to distances, trail intersections, changes of directions, and so on. Our interest is not in the accuracy or potential usefulness of this different kind of model but in the light it may shed on a way of thinking which may extend far beyond mere map making. The villagers use no other kind of map; they do not use drawings in constructing a building or a piece of furniture--in fact they hardly use drawings or spatial representation at all (except for records of land ownership, which does not change very frequently), and the lack of spatial models may be very natural. One wonders, however, whether the science teacher will have this in mind when he presents a model of a molecule or the solar system.

Variations between Groups

Our observations were the same for all three of the Nepalese groups we visited. No doubt this is partly due to the rather gross nature of the study, which may bring out only the most obvious and general conclusions where a finer-grained, more extensive study could be expected also to reveal characteristics that pertain to one group only. From the standpoint of science education, however, it is useful to start with observations that lead to widely applicable recommendations, and this has been a factor in the design of our study. Certain differences between groups are suggested by the results of our interviews, however, and we mention below two that might well be of further interest.

Although observation was practically never suggested explicitly by any group as a reliable source of knowledge, we did find many indications among Limbu respondents that observation of nature plays an important role in shaping their attitudes, and also that they feel a need for observational support of theories to an extent not found in either of the other groups. Thus, whereas our Newar respondents always had a firm answer to every question, it was not uncommon for a Limbu to give a reply and then add, "it seems so, but we are not sure," or even to admit that he had no explanation of a given phenomenon. All groups described the rainbow as a manifestation which draws water up from lakes or rivers into the sky. However, more than one of the Limbu respondents pointed out to us that a rainbow may be seen in waterfalls when the sun shines on them, "and so it must have something to do with light and water spray or vapor."

Newar respondents always attributed lightning damage to a particular variety of thunder,[10] literally "ax-thunder" (we refer to it here as a "thunderbolt"). They describe it as a material object, shaped like an ax, which falls from the sky during a thunderstorm and returns to the sky again, splitting or smashing things on its way. They offer no evidence to support this description, except to refer to the knowledge of old people, if evidence is demanded. When we asked Limbus about thunder and thunderbolts we were told essentially the same thing, with the added information that "thunderbolts" are black in color. We did not question this explanation nor ask for any

evidence, yet in a few minutes one of the informants produced a small, black stone artifact shaped like an ax-head. He explained that it was a "spent thunderbolt" which had been damaged when it struck the earth and, being imperfect, could not return to the sky. Further inquiry indicates that such artifacts are occasionally found on the ground or in rice paddies. They are not made from locally available stone and are not believed to be of human origin but are always taken to be "thunderbolts." They fit the mythological concept of "ax-thunder" closely enough to make identification of them in this way very natural, provided a need for observational support of the theoretical concept is felt. Obviously our informant felt that, in our minds too, this evidence would support his explanation.

This experience was duplicated in every essential detail in the community of Armala Dihi 300 kilometers to the west, where we were again presented with a stone-age "thunderbolt"! Other evidence of a need for empirical observation was less strong, however, in Armala Dihi than in Tokma.

Finally, there are differences among these three groups in the degree of stress produced as a result of new ideas from the West. All groups and all individual respondents know that change is coming rapidly to Nepal and that many new ideas are reaching the young people through the rapidly expanding school system. Among the Chhetris of Armala Dihi this is evidently a source of much personal and intergroup tension. The adults welcome schools and urge or require their children to attend them, yet they are engaged with the children in a continuing and sometimes strenuous dialogue in defense of the old ideas and cosmology--a dialogue in which both adults and youths did their best to enlist our participation. Although the adults clearly identify themselves with the old order, they are intensely curious about the new. They seem not to tire of asking questions that range widely over a world of ideas just visible over a still-distant horizon. None of our respondents had served as Gurkha soldiers, but, as we have pointed out, the region includes many individuals who have. In contrast, the Newars of Panga, certainly the most conservative of the three communities, show very little curiosity about the world outside Panga and evidence very little concern about what their children may be learning. The Limbus, too, showed little concern about foreign ideas, which they know about but do not perceive as threatening. They seemed to show a similar lack of concern about a number of introduced Hindu rituals which are practiced and yet disclaimed as foreign and of no value. Such patterns of receptivity or rejection of change and the stresses they lead to in individuals or families are, of course, too complicated to be treated here. Yet they are important to the processes of development and education, and they deserve careful study in considerable depth.

Implications for Science Education

The foregoing observations suggest changes in method or content which might lead to easier and more economical, as well as more effective, teaching of science in Nepal. We believe that some of these changes will be found to apply more or less well in many other developing countries, and we hope that similar, or more

refined, studies will be undertaken which will extend and, hopefully, corroborate our conclusions. For the present we shall limit ourselves to a few relatively clearly indicated changes that could be introduced on a pilot scale.

It is clear that the school-age boys and girls among our subjects do not have the attitudes about nature and learning that are most conducive to an understanding of science. Clearly, too, they have not developed much skill in abstract representation, measurement, and so on--skills which contribute not only to scientific experimentation but to conceptualization as well. It is now well accepted that such attitudes and skills can best be developed relatively early in a child's school experience, well before the introduction of formal subject-matter courses like chemistry or physics. We believe that a program of pre-science instruction in the elementary grades, similar to programs now under development in the United States,[11] will be both possible and very desirable in Nepal and probably in other developing countries. This instruction may well follow the general guidelines that have been laid down for the American efforts, but it will have to be adapted to conform closely to the particular environment, needs, and available resources of the country and community where it is used, and it should start with the questions children ask there. The project will involve program design and teacher training but no difficult economic problems pertaining to equipment or supplies, for local "phenomena" for observation are best and are abundant; "laboratory material" will consist of leaves and pebbles, sunshine and seeds; and equipment will consist of pieces of bamboo, locally available utensils, and so on. Such a program can certainly present real phenomena and teach real facts, but its fundamental intent is to provide a basis of skills and attitudes and a relation to nature, rather than facts as such. In a school system that relies heavily on memorized factual content this will be a delicate undertaking.

We have noted the prevalence of a dual view of nature or reality which was especially striking because the two views expressed seem to us contradictory, although accepted simultaneously by our subjects. If this paradox is new in Nepal, it is certainly not new to the West. The same ambivalence has run through Western thought at least since the early scientific revolution, and it is still with us. What scientist in the West has not heard the question, But how can you be a scientist and still accept that view? or has not at one time or another agreed to speak on "Science and Religion"?

Yet for the most part we in the West have been able to make our peace with the complementary worlds of matter and spirit, of objects and values. Through careful delineation of boundaries, conscious and unconscious compartmentalization, or reinterpretation, and a variety of intellectual nonaggression pacts, a reasonably secure and peaceful coexistence has been achieved, so that this particular dualism no longer poses serious problems for the Western scientist or student. Can others be helped to achieve or preserve a coexistence that does not violate their cultural values as they try to assimilate our Western science and scientific viewpoint?

We propose, as one step, that science be presented as a "second culture," complementing that already present rather than replacing it, and taught in the spirit in which a second language is taught--to be learned and used, certainly, but not to the exclusion of the student's native tongue. This will require a very different orientation from that commonly found in most Asian schools, or indeed from that characteristic of most Asian-American relationships, even if it does not mean great changes in school curriculum. Beginning with the earliest missionary schools and continuing through the period of colonial schools, the attitude, and often the intent, of Western education has been that a "primitive" or "decadent" civilization is to be replaced with a more modern and "better" one.[12] This attitude tends to continue even though colonialism is no longer a force behind it, and it tends to be particularly strong in science teaching, for science is taken to be the one really unique and powerful offering of the Western world. In fact, however, the purpose of education, whether in Nepal or elsewhere in Asia, is no longer to destroy one civilization, or even one set of ideas, in order to replace it totally with something that is conceived to be better; to proceed in that direction, or with that implicit attitude, is to create unnecessary difficulties along the way. An implacable either-or approach, leading to a direct confrontation between traditional attitudes and a modern and very foreign approach to knowledge, invites conflict both within the student's own mind and between him and his elders in the community.

As has been seen too often, such a conflict results at best in a draw, which alienates from one world without really admitting into the other. We propose to avoid or postpone this confrontation by starting early science instruction with simple observations of ordinary things and events--observations which stimulate and use the child's latent curiosity, which anyone can make, and which demand no special or formal interpretation in cosmological or philosophical terms. Instead, this approach will provide a foundation of skills, of attitudes toward observation, and of specific observations upon which a more formal knowledge of science may later be built. In making this proposal we accept a complementarity of views as natural and perhaps as inevitable.

We are mindful of certain arguments that favor, in principle, the opposite alternative of immersing the student in the Western scientific culture, through study in the West, and demanding that he learn it and conform to it totally. Of course, this "total immersion" would not be possible for most Nepalese children or adults, the vast majority of whom do not in any case expect or wish to become scientists. Beyond this lies the fact that any who were to succeed in such a "total immersion" and then return to work and live in Nepal would be sure to find themselves seriously alienated. To a considerable degree this does happen to Asian graduate students who leave home to study in the United States and then, partly because of the consequent alienation, find themselves unenthusiastic about returning home. Once immersed, one is more comfortable to

remain so.

We are mindful, also, of a seeming contradiction in our proposal. If extensive social and cultural changes are bound to accompany the introduction of science, is it wise to ignore this in preparing the child for learning science? We believe that it is. Of course, some kind of accommodation between the scientific revolution and Nepalese culture must and will eventually be reached if science is introduced at all. This is a complex matter which must evolve slowly within the Eastern cultures as it did in the West. Experience suggests that this accommodation will not be most easily achieved simply by substituting the one for the other, and particularly not during the school years when the children are immersed in the intellectual and physical environment of the village. It is important to them and to the village that they remain at peace there. Moreover, an eventual accommodation should be based upon real science well learned rather than on a set of memorized facts and formulas learned under stress.

To refer again to the analogy of language teaching, recent experience seems to show that the attitudes and techniques used in teaching English to, say, Urdu-speaking children, where no question of substitution or conflict arises, are the most effective in teaching a standard English to children, in Hawaii or Georgia, for example, who speak a "substandard" dialect of English. It is easier for these children to learn standard English when it is presented as a second language, not as a substitute for their own "incorrect" dialect, which of course they continue to need in their own community.

Elementary Science Instruction

A detailed program of instruction in science (many might prefer to call it pre-science) is under development in Nepal, partly as a result of the observations reported above. It would be premature at this time to anticipate its final dimensions or content, but we may say a few things about its methods and goals. Emphasis will be on an observational approach to phenomena which are familiar to anyone, or which can readily be produced by anyone, and a progression of skills and experiences will be built up, encompassing classification, measurement, generalization, inference, and quantification, and leading ultimately to the design and execution of elementary but conceptually more or less sophisticated experiments by the students. The material presented will contain some specific information intended for later use, but this will not receive major emphasis and need not be memorized. In addition to the observational material, some history of science will be introduced, in essentially anecdotal form, to show that knowledge of "books and old people" is really a record of observations and interpretations made by real people.

The educational system of Nepal, like that of many other countries, is fairly rigid and is not amenable to rapid change or experimentation. Nevertheless, we see it as necessary that improvements, to be lasting, be developed within the existing system, however time-consuming that may prove to be; hence, such efforts must have

the understanding and active support of those persons who are in positions of leadership and authority within the system. The program we are proposing will be developed within the Education Ministry and tried out in the laboratory schools of the College of Education of Tribhuwan University. Further trial and development with the help of Peace Corps teachers, now working in many schools throughout the country, is anticipated. These Peace Corps volunteers are enthusiastic, well accepted, and devoted to the improvement of education. If the program has the endorsement of the government, they will be ready to try it out with very little feeling of hesitancy because the teaching methods are new and different. Moreover, there is reason to hope that the interest in better science teaching which has resulted from the American experimental curricula in secondary school science will result in changes and improvements in Asia, and perhaps in Nepal, affecting the teaching of science at the secondary level. These American courses, as well as other studies,[13] emphasize observation and experiment. We hope that a program such as the one we propose for Nepal at the elementary levels will provide a useful preparation for more formal course changes patterned on the American model. In fact, we believe that some such preparation will be found necessary if science courses based on the American experimental courses are to maintain their spirit and emphasis as they are adapted for use in Asia.

In concluding, we must emphasize that much of what has been said is tentative, based as it is on a limited pilot study. Yet the study does indicate that research of this nature can provide needed perspective for the improvement of science teaching in non-Western countries. We hope it will lead to more study and discussion, with regard both to Nepal and to other developing countries.

References and Notes

[1]Gruber, R. Science and the New Nations (Basic Books, New York, 1961).

[2]U. S. Agency for International Development, Science, Technology and Development: The U.S. Papers Prepared for the United Nations Conference on Applications of Science and Technology for the Benefit of the Developing Nations (Government Printing Office, Washington, D.C., 1962-63).

[3]Dart, F. E. Foreign Affairs 41, 360 (1963).

[4]Malinowski, B. Science, Religion and Reality, J. Noodham, Ed. (Macmillan, New York, 1925).

[5]Hsu, F. L. K. Religion, Science and Human Crises (Routledge, London, 1952).

[6]Evans-Pritchard, E. E. Witchcraft among the Azande (Oxford Univ. Press, London, 1937); J. Needham, Science and Civilization in China (Cambridge Univ. Press, London, 1954).

[7]Barnouw, V. Southwestern J. Anthropol. 11, 15 (1955).

[8]See, for example, J. M. Roberts, M.J. Arth, R. R. Bush, Amer. Anthropologist 61, 597 (1959).

[9]Here we consider only children old enough to be capable of abstraction. See, for example, B. Inheldef and J. Piaget, The Growth of Logical Thinking from Childhood to Adolescence (Basic Books, New York, 1958).

[10]Newars refer to four or five different kinds of thunder, of which this is one. Each has a name and is distinguished from others by the quality of sound perceived.

[11]Gagne, R. M. Science 151, 49 (1966); see also, "Science--a Process Aproach," AAAS Comm. Sci. Educ. Pub. (1965).

[12]See, for example, R. I. Crane, in The Transfer of Institutions, W. B. Hamilton. Ed. (Duke Univ. Press, Durham, N.C., 1964).

[13]"Guidelines for the Development of the Laboratory in Science Instruction." Nat. Acad. Sci.--Nat. Res. Council Publ. No. 1093 (1962).

[14]We gratefully acknowledge the support and assistance of the Government of Nepal, the United States Education Foundation in Nepal, and The Center for Cultural and Technical Interchange between East and West in Honolulu in carrying out this study.

DRAWINGS BY NEPALESE CHILDREN:

NOTES ON CONTENT, SYMBOLISM AND SPATIAL CONCEPTS.

A CROSS-CULTURAL CONSIDERATION*

Thomas O. Ballinger
and
Norman D. Sundberg

Introduction

This is the second in a series of reports on the drawings of Nepalese children. The materials comprising the data for this present study were obtained by one of the authors in Nepal during a two-year period, 1956-1958. The intent of this particular writing is a consideration of the visual and observable phenomena as these relate to the culture and the comparison of symbols used by Nepali and American children in their drawings. Psychological aspects of the data were discussed in an earlier publication by the authors (Sundberg and Ballinger, 1968).

Drawings of children continue to attract scholarly attention. Studies designed to measure intelligence, to visually describe personal experiences and events, and to reveal how the child conceives of the world through drawings are but a few of the many areas of inquiry that have been undertaken and have subsequently found their way into the literature. Such data have been reported in journals representing disciplines of wide and diverse interests. (Dart and Pradhan, 1967)

Although children's drawings from Western societies have been rather extensively studied and there are many examples of small collections obtained by investigators from unusual and esoteric areas, there is a noticeable absence of systematic material from the so-called underdeveloped countries. The present study makes use of an extensive collection from Nepal constituting selected data from remote and isolated geographical areas from which it has been difficult to obtain significant material. The collection of both extensive and specialized material often proves to be most rewarding and frequently affords the investigator the opportunity of introducing new strategies and insight into the general body of research information. Attitudes, feelings, social values and the like, appear in children's work with a directness and a truth which is frequently

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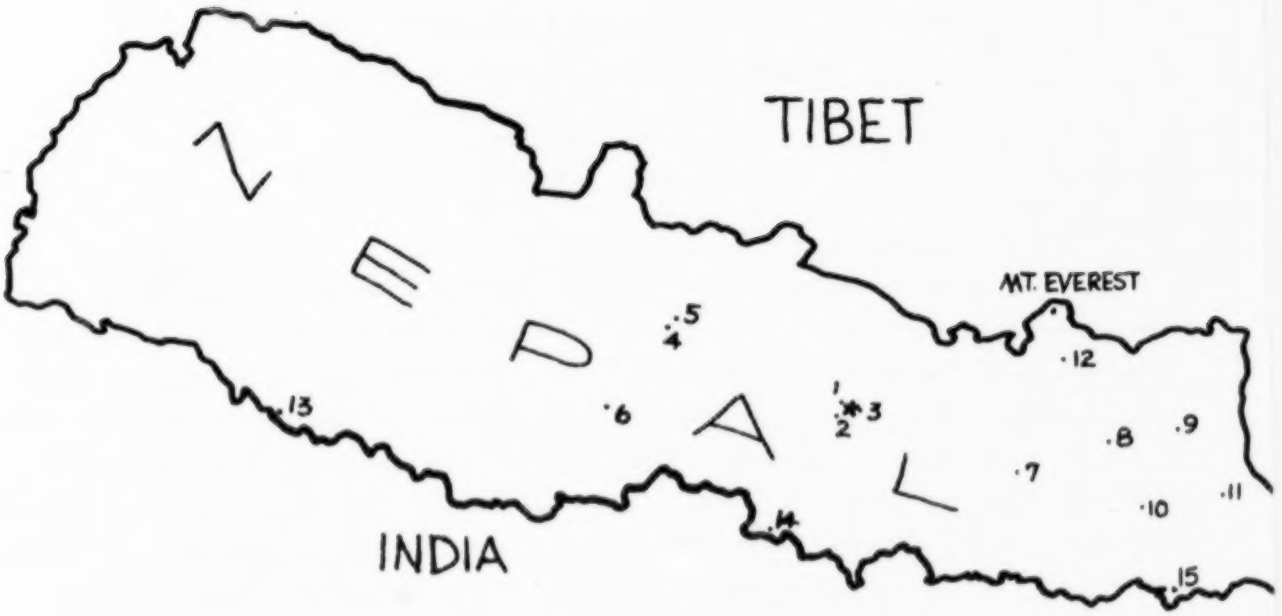

The map above identifies regional areas and major centers where data were obtained for the accompanying article on children's drawings.

1. Kathmandu
2. Patan
3. Bhadgaon
4. Pokhara
5. Bartulichawr
6. Tansin
7. Okhaldhunga
8. Chainpur
9. Taplejung
10. Dhankuta
11. Llam
12. Chaunrihara
13. Nepalgunj
14. Birgunj
15. Biratnagar

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disguised in similar behavior at the adult level. Innovation, freshness and the uninhibited use of fantasy are but a few of the characteristics found in the drawings and paintings of young children.

This paper constitutes an inquiry into the phenomenon of the Nepalese culture as the Nepalese child sees it and describes it through his drawings. It shows evidence of his search for form and meaning through the vehicle of drawing. Using symbols, known and invented, he draws upon this information and material in describing his understanding of his world.

The Area of Study: Geographical, Historical

Nepal, lying to the north of India and to the south of Tibet, until recent years had successfully and stubbornly resisted foreign intervention into her political and social life. The terai, a malarial belt extending some 500 miles along her southern border, and the Himalaya, the highest mountain range on earth, protecting her northern frontier, had discouraged any significant penetration. With the exception of a Tibetan-Chinese invasion in 1792, Nepal has remained sovereign since 350 A.D., the era of the Lichchavi Kings.

In 1951 an internal political revolution

changed Nepal's relationship with the outside world. The hereditary system of Prime Ministers was overthrown, and the King restored to the throne. The new government elected to cast its destiny with the technology and innovations of the 20th century, which subsequently resulted in Nepal extending invitations to Western powers for technical assistance through foreign aid programs. A contractual agreement between the University of Oregon, the United States Government and the Government of Nepal afforded a unique opportunity for the collection of the data in this study. It constitutes the first research of its kind in Nepal and was obtained during a period of Nepalese history when a medieval way of life still persisted.

The Data: Sources, Extent and Use

The drawings obtained for this study are representative of the many diversified geographical and linguistic regions of Nepalese (or Nepali) society. Urban centers, villages, jungle areas and mountain communities in Eastern, Western and Central Nepal served as selected resource areas where the data were collected.

The research materials total 3,600 individual drawings executed by some 900 Nepali boys and girls. Ages ranged from 6 through 13 years. The above data also include drawings obtained for several independent studies. A program designed to establish norms for a Nepalese Draw-A-Man test and the subsequent collection of drawings of man, woman and self from over 800 boys and girls constituted a major area of inquiry. (Sundberg and Ballinger, 1962, 1968). In addition, random samples taken during free drawing periods, plus material expressly designed to determine directional preferences, completed the body of the data. Figure 1 presents the Draw-A-Man results and forms a general background for the remainder of this paper.

The Draw-A-Man-Woman-Self procedure, as it might be called, followed Harris's revision (1963) of the Goodenough scale. Children were tested by Nepali psychologists or teachers in their classes. Scoring made use of Goodenough criteria for items of content, amount of detail, proportion and the like. Using American norms, the average Nepali IQ's dropped from approximately 100 at age 7 to 75 at age 13.

This noticeable drop in measured IQ's as the child reaches the teens is consistent with the results found in the studies of drawings from other cultures (Dennis, 1957). Herbert Read (1961) further contends that this observation is also evident in the drawings of the aboriginal child. In the Nepalese sample no significant IQ differences could be related to sex or caste. However, the geographical region where samples were obtained did influence the IQ data; children in the central Kathmandu Valley did show higher scores (Sundberg and Ballinger, 1968). Drawings showed the child's ability to identify sex. Children clearly indicated awareness of tribal and regional identification through visual description of costume, clothing, detail, ornamentation, etc. Such observations were also found in the American data and were reported in an earlier study (Terwilliger, 1960).

General Observations:
Design, Symbolism, Motor Skill,
Subject Matter, Spatial Relationships

Where similar research has been undertaken relative to children of other cultures, drawings

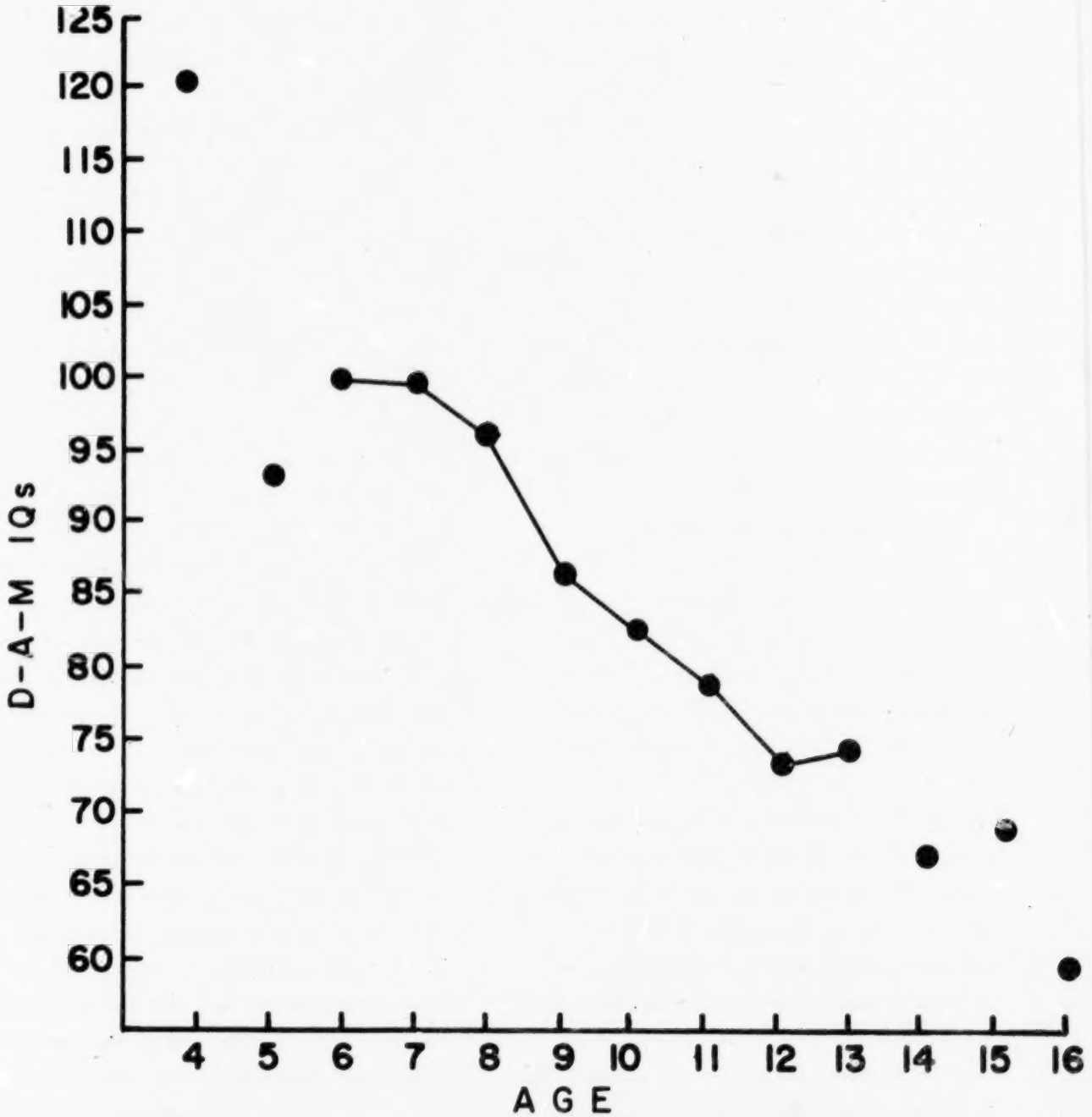

Figure 1. Mean Goodenough Draw-A-Man IQ's of Nepalese Children by Ages

were found to describe and record events of personal experience. This has also proven to be the case with regard to Nepalese children's work. Nepali boys and girls drew what they knew about their society, i.e., their world. Knowing, as it is used in this context, implies the utilization of the child's total sensory apparatus and consequently does not limit description, through drawing, to the visual sense alone. The validity of this basic position is well established in the research of earlier investigators such as Lowenfeld (1964), Eng (1931), Arnheim (1954), and others.

The Nepalese boy and girl, in developing the schema of the human figure, create a rectangular or square shape not unlike the geometric designs found in the drawings of Alorese children (DuBois, 1944). A cross-cultural commonality in the drawings of the very young is a progression of control through several developmental periods, as noted by Lowenfeld. Random longitudinal and finally circular scribblings precede recognizable forms. By the sixth year, however, most children have reached a stage of development where they can and do use forms and symbols which relate to the visual and known world. The child can repeat these by controlling the tool which he uses to express his ideas and concepts. Emergence from scribbling to later developmental stages does appear to vary upon cross-cultural examination, however. Factors causing a more accelerated move toward the development of significant form would most certainly take into account the following: (1) drawing would be a normal and frequent activity, (2) it would be a normal and frequent activity for the peer group, (3) the availability of drawing materials, and (4) approval, support and reinforcement of drawing as a form of behavior and the recognition of its social value by the adult members of the society.

Of particular interest to this study is the examination of Nepalese and American children's drawings during the intermediate and pre-teenage years. It is here that the distance widens and visual differences become most noticeable. Nepalese children continue the use of geometric shapes for a much longer period of time than American children. Tradition and the rigid social structure of Nepalese society does not allow the range and the freedom of expression that the American child enjoys. Family, social and religious mores are a part of early socialization in Nepal. The lack of inhibition with which the American child may often approach his peers, his family, his teacher, and the adult world is unknown to a Nepalese boy or girl. Role playing in Nepal is traditional and dictated by case requirements. In the drawings of the American ten or eleven-year old, as an example, we see the use of the curvilinear line and an integrated design concept, one which considers the two-dimensional plane upon which the drawing is done. The Nepali child at this age, on the other hand, continues to use shapes and symbols not unlike those of younger American children, i.e., circles, squares and rectangles. These are generally placed in space with little or no apparent relationship to the composition of the drawing as a whole. What appears then in the drawings and paintings of the Nepalese child are isolated islands of figures arbitrarily placed in space.

Like children in other cultures throughout the world, Nepali boys and girls use a variety of symbols in their drawings. Girls show a preference for water vessels and simple water systems such as spouts and pumps. Obtaining water for family needs is the responsibility of older girls and women in the Nepalese social system. Thus, cultural identity for the Nepali girl is projected as this relates to the experience and the preparation for the adult role of the woman. Nepalese boys seem to prefer a more rigid, geometric use of line. Straight lines appear to take precedent over what could possibly be other alternatives. Boys seem to have a higher development of motor skill when drawing. This observation could be due to the fact that the boy learns to write, and to use writing media, at a much earlier age than girls. Until recent years, girls were never encouraged, or indeed permitted, to write. In Nepal the literate woman threatens the status of the male. To marry an educated woman in Nepal continues to be looked upon with suspicion and reservation in all but the upper social structure of the society.

Writing, the privilege of the elite until the revolution of 1951, has similar kinesthetic motions, problems in space, scale and design and motor coordination requirements found in drawing. Sanskrit, the parent linguistic form of the Nepali language and the Devanagri script, has no specific word for drawing. In Nepal today, drawing is referred to as writing. Obviously then, the new experience of "writing-drawing," for the Nepali child, is one which ultimately carries with it the need to develop proficiency if writing success is to be realized. Such skills as writing are taught by rote under the Nepali system of education. It follows then that when some success of skill is manifest in a drawing, the child is prone, indeed is encouraged and tempted, to repeat the initial success. Such teaching methodology does little to promote change or innovation. Repetition in drawing is practiced by both sexes to a considerable degree, and we have observed that in a closed society, such as that found in Nepal, art forms change very slowly. Any exception to this observation would be the result of the influence of Western ideas in very recent years. The impact and implementation of new thinking, however, would without question be localized to the more urbanized and sophisticated area of the Kathmandu Valley.

Nepalese children of both sexes use many recognizable symbols showing costume, ornamentation, tika marks (a spot on the forehead used by Hindus) and like cultural notes. Animals appear on occasions; however, this symbol, as an example, is used rather infrequently when compared to its use by Western and American Indian children. Birds often appear. Flowers, generally shown growing in containers, or pots, are often portrayed in a formal, symmetrical manner. (Fig. 2) Symmetry appears to be of significance as an element of aesthetic balance, and its consistent use suggests a relationship to environmental influences. The caste system continues to play an important role in Nepalese life. Role expectancies are learned by the Nepali child at a very early age. While a correlation of the use of

Figure 2. Floral designs by seven year old girl. While no attempt at symmetrical balance is evident in the drawing as a whole, the child does show a use of symmetry in her renderings of the individual units of flowers and trees. Such stylized examples as these are typical of the way in which the Nepali child draws flower and tree forms. (Note: The childs' name appears in the upper-center area of the drawing and may be considered as a part of the over-all design. Entries made on the lower-right side of the paper were made by the teacher at the College of Education Demonstration School, Kathmandu, Nepal.)

symmetry in drawing and social structure may be highly speculative, the idea of such a relationship merits further study and consideration.

The drawing of the automobile appears to be used as a status symbol by some Nepali children. Such drawings are generally confined to the Kathmandu Valley, the one area in the country where some semblance of road systems exist. Some forty or more years ago the automobile made its first appearance in Nepal. At that time the chassis and all necessary parts were laboriously carried over tortuous mountain trails by human porters. The expense of such an enterprise was exorbitant, and the ownership of any automobile was the sole province of the Prime Minister and members of the Rana family. In many examples of drawings by a child of the Rana family, the automobile symbol will appear, suggestive of the child's conscious awareness of family name, status and kinship ties.

The boy and girl of Nepal deals with spatial relationships differently than does the American child. As an example, in Nepalese drawings perspective, as we understand and use the term in the West, is simply not employed. Figures and symbols seem to float in space in much the same manner as one finds in traditional Chinese and Japanese landscape painting. Shapes appear to be totally unrelated. Young American children use a base line. The Nepali child uses none. The understanding then of "self on a plane"

Figure 3. Pencil and wax-crayon drawing by a nine year old girl. It is a sensitive and decorative rendering with stylized trees and a mountain range shown in a spatial relationship to the human figure. Perspective is similar to techniques found in Persian and Indian miniature painting. Random horizontal, vertical and diagonal lines are used to fill in what would otherwise be a blank background. As an inate, intuitive designer the child deals with the totality of the dra ng surface. (College of Education Demonstration School, Kathmandu, Nepal.)

(base line), as developed in the research of Lowenfeld, is viewed, or "felt," differently by the children of the two respective societies. (Fig. 3).

The use of the sun and/or moon symbol is infrequently found in Nepalese children's drawings. However, both the above symbols appear in Tanka paintings (wall banners) and in other adult examples of religious-cosmic symbolism such as astrological charts and medical diagrams. It is of further interest to note that the sun and moon constitute the two major shapes forming the design of the Nepalese flag. In a culture where religious belief requires both union and polarity, Nepali children's drawings of the sun and moon are conspicuous by their absence. No theory or explanation of this is currently suggested. It is of interest to observe that in the drawings and paintings of children in the Western world the sun symbol plays a prominent role.

The Human Figure: Details, Symbols and Scale

The details of the body as drawn by children are significant and some observations of a cultural interest may be reported in this writing.

Figure 4-a. The above drawing shows the use of basic geometric shapes, i.e.; circle, rectangle, triangle, to create the scheme (body form). The spatial relationship of the "woman" to the drawing field, indicated by the rectangular area, is of interest. (See Fig. 5-b for contrast)

Figure 4-b. Dramatic use of space is evident in the drawing of a ten year old boy. Compare this with the other example (Fig. 5-a) for comparative scale use.

Symbols representing various parts of the human anatomy are drawn differently by the Nepalese child than by the American boy or girl. (Fig. 4 a, b, c).

The hourglass figure, frequently found in the work of primitive peoples, appeared to be local to the Terai area in the south of Nepal. It was observed that the examples found painted on the outside walls of mud and dung houses of the Tharu culture were not the work of children. Many such designs are found in this area and in the adjacent Indian villages immediately to the south. Nepali children's drawings, however, seldom used the hourglass or pyramid-inverse pyramidal form.

Male and female genitalia are frequently used by the Nepalese child to indicate an awareness of sexual differentiation. Little concern seems to be attached to its description by the child. (Fig. 5 a, b, c). It is the rare and unusual example of drawing by an American child, however, which depicts the genitalia of either sex.

The nose is represented in several different ways by the Nepali. Figure 6 shows three of the most common nose symbols used. All four examples are found in frontal drawings, few profiles being observed in the Nepalese data. In general the Nepali noseline tends to be more curvilinear and flowing than the American sample. The most

Figure 4-c. Two drawings of "man," by a Sherpa boy from the Solu Khumbu region in the area of Mt. Everest. In the above example we again see how the Nepali (Sherpa) child develops the body scheme from geometric shapes. Extremities emerge from a square (body). The scheme in the above drawing, is a combination (body-arms-legs) which subsequently results in the total form.

Figure 5-a. In the above drawing by a nine year old girl, we see how the Nepali child uses the symbols of facial detail, i.e.; the lotus or almond eye shape, the nose underneath a tika mark on the forehead. Female reproductive organs are also shown.

frequently drawn nose-shape by Nepali children is shown in Figure 6a. This shape has a "w" at the tip of the nose suggesting the child's awareness of his nostrils. This interesting "w" portrayal is not anatomically correct, but may be realistic to the Nepali child in a feeling or haptic sense.

In the Solu Khumbu data 55 percent of a total sample of 145 drawings shows the nose type found in Figure 6a. Solu Khumbu is predominantly a Sherpa community. The influence of the culture of Tibet may be seen in costume, calligraphy and in religious ritual. It is of interest to note that, in the main, the only drawing and painting available to the visual experience of the Sherpa child is found in temple fresco wall paintings and in Nepalese and Tibetan Tankas. Such painting and wall banners are used for religious purposes and constitute the norm in painting and drawing for the Sherpa culture. Many Tankas have as their focal point of design a central figure. Often surrounded by smaller figures (of disciples or lesser personalities of the Buddhist pantheon), it is of interest to examine the nose shapes of the major and minor deities. The lower case "w" shape, describing the nose, is in use here. In drawings showing a high degree of

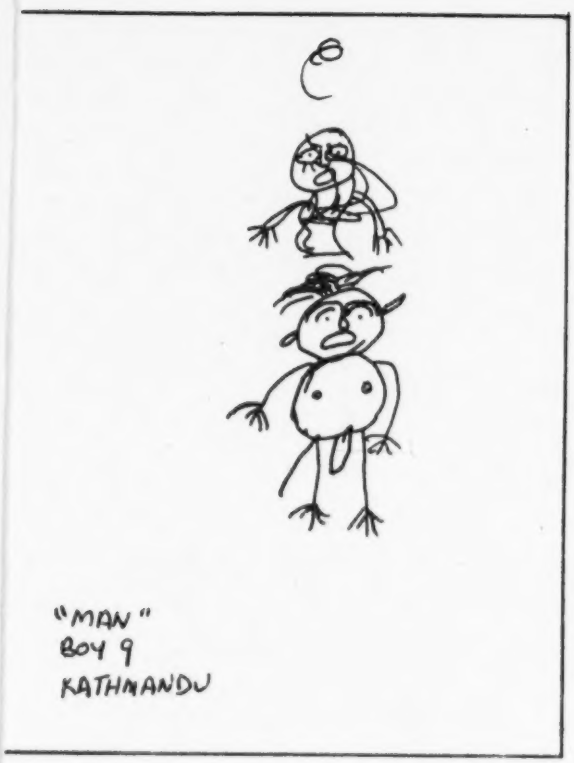

Figure 5-b. Nepalese children frequently show male and/or female genitalia in their drawings. The lower of the two renderings above show male chest nipples and the male reproductive organ. The oval shape, symbolic of the male penis, is depicted here as a solid form. In showing the female organ(s) however, (Fig. 5-c) the child draws the same oval shape which is now used to describe a concave area (vagina) rather than a solid form (penis).

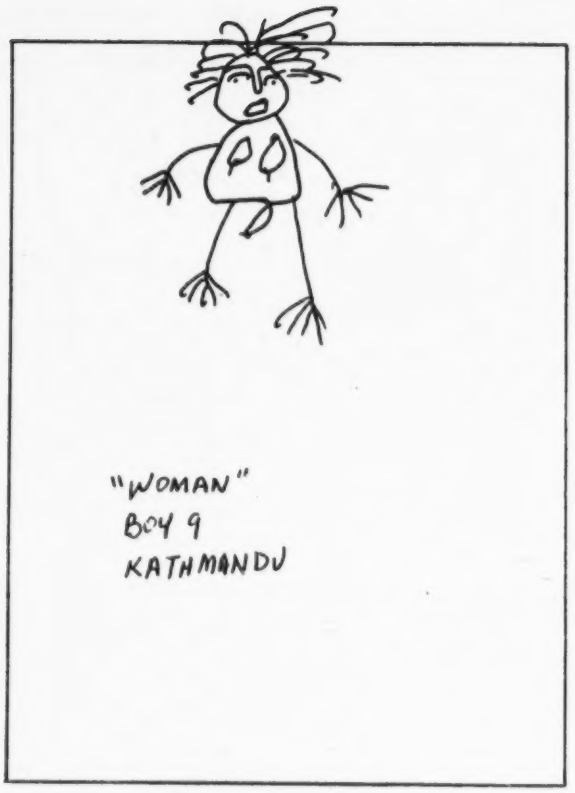

Figure 5-c. The same boy (Fig. 5-b) draws his concept of "woman." Here we have an example of the female reproductive organ appearing as a non-solid form. Similarity in the use of the oval shape may be attributed to impossed limits of (1) abstracting the object(s) from a three to a two dimensional plane and (2) technical skill.

skill and craftsmanship, however, the adult lama artist adds an additional central loop to the nose form extending it lower than the loop on each side of the nose as shown in Figure 6d.

The question then of the child emulating adult forms in his drawings (such as nose style) is very real, and the opportunity for copying adult symbols is encouraged and indeed required. It is further suggested that in a highly structured and closed society, where visual imagery used in religious practice is subject to little or very slow cultural change, resistance to change is reflected in the drawings of children. In a social order, where little or no drawing is done other than for religious purposes, we might expect the older child to change his drawing of the nose style only if he observes evidence of such change at the adult level of drawing.

In the investigation of Paget (1932) which we discussed in our previous paper (Sundberg and Ballinger, 1968), it was his opinion that the nose on the frontal view of the human figure

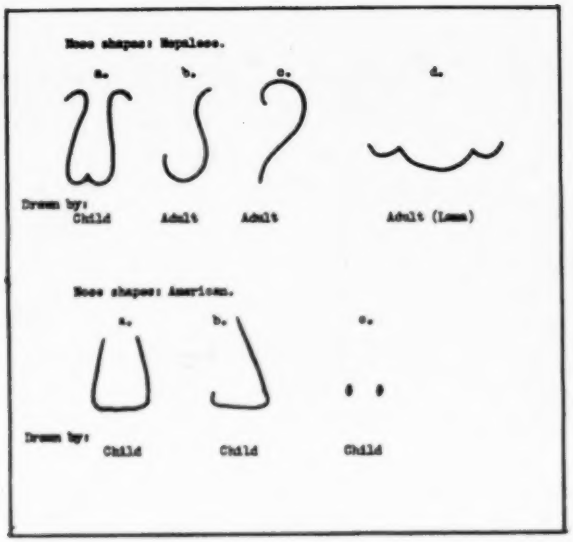

Figure 6. In the above examples of comparative nose shapes, a is most frequently used by Nepalese children in their drawings. In the main, all reproductions of Nepali childrens' drawings in this paper are shape a or a slight modification of the a shape. b is the right half of the nose shape shown in example a. Shape b is seldom used by Nepalese children and constitutes a more sophisticated solution to drawing the nose. b further suggests a different spatial concept by the use of the profile line rather than the frontal example shown in shape a. Nepalese shape c is the nose symbol so frequently found painted on the harmika of the Buddhist stupa form of ecclesiastical architecture in Nepal. Shape d is also used in a religious context. It is associated with the drawings executed by Lamas and found on Nepalese and Tibetan wall banners. Generally such drawings and painting show a higher degree of draftmanship and skill.

shows the widest variety of symbol usage from group to group. Paget further contends that drawing "style" appears to be handed down to children from one generation to the other, and he further qualifies this with the premise that this takes place without direct adult instruction and without imitation of adult representation. Our earlier comment; to the effect that the Nepalese child is socially conditioned to respecting adult mores, and the symbols of the adult culture, questions the Paget observation in regard to children not imitating adult representation. The educational system of rote learning and the need (indeed the requirement) to copy is without question a part of the learning process of the Nepalese child.

Teeth are often dramatically shown in the drawings of the Nepalese child and appear as saw-toothed and sharp. Strong diagonal rather than vertical lines separate one member from another (Fig. 7). In a culture where eating utensils are virtually non-existent, the importance of teeth is notable. Teeth are used as tools (cutting) and because of their obvious utilitarian importance, they appear in this form.

Fingers on the hand (Fig. 8) are frequently shown as straight lines emanating from a circular or square shape. Occasionally more than five lines (fingers) will be drawn. Such an over-simplification of the hand-finger detail is inconsistent with the somewhat more mature drawing detail found in other parts of the body and in the body schema, per se.

Knees are pronounced and symmetrical (Fig. 9). The drawing of knees and feet (Fig. 10) are distinctly Nepalese in character. It is of

Figure 7. Drawing by nine year old boy showing teeth-forms.

Figure 8. Hands and feet are shown here as simple circular shapes with extenders and smaller circles representing fingers. Having limited experiences with drawing materials and little or no opportunity for solving problems visually, this 12 year old boy uses symbols of younger children. It is not uncommon to find this level of symbolic description being used by children in the 12 and 13 year old age group.

interest to note that while Nepali drawings of the human figure are generally depicted in a frontal position, feet are drawn in a left or right orientation to the leg stem. The position of the feet is not unlike schematic representations of figures found in Egyptian wall painting. In addition to the direction in which feet are drawn, the view of the feet is generally shown in aerial perspective. It follows that this is precisely the view that the child has of his own feet, and that he is literal in describing his understanding of this knowledge. In aerial perspective views toes are also shown.

Eyes tend to be drawn in an almond or lotus shape. Rowland (1953) states that the Hindu artist, when drawing the human body, has traditionally drawn upon naturalistic forms to use as parts of the whole design. Some traditional visual description in children's work may also result from the influence of Persian and Indian miniature painting; however, this speculation remains to be investigated. (Fig. 3 is a good example of this observation). Today in Nepal women and young girls use a heavy black marking material (khol), which gives the eye an elongated appearance similar to the stylized eye shapes

Figure 9. The above drawing shows the child's awareness of the knee-joint and his attempt to show this understanding visually. Drawings by other Nepali children show knees as circles or, as open circles separating the upper and lower leg stems.
i.e.:

Figure 10. Feet and toes are shown in a schematic, aerial-perspective pisition. Only on a very few occasions, (by older children) did feet appear to be placed in a frontal position.

found in examples of both painting and sculpture portraying the ideal Hindu beauty. The importance of the role of the eye in drama, the classical dance, the song and in flirtation, as a preliminary state in love making, cannot be underestimated in this context. Nepalese are eye conscious. The above influences have an impact upon the Nepalese child, and examples found in their drawings of eye shapes would seem to support such a notion.

X-ray drawing, in which the child reveals his knowledge of hidden areas, i.e., house interiors, anatomy beneath clothing, etc., is used by the Nepalese child in very much the same way as it is used by American children and children in other cultures. The use of transparency in other cultures may be found in Zuni Indian pottery design as well as in the drawings of aboriginal Australian children. This method, then, of showing an awareness of "inside" information tends to be universal and is not exclusive to the Nepalese (Fig. 11).

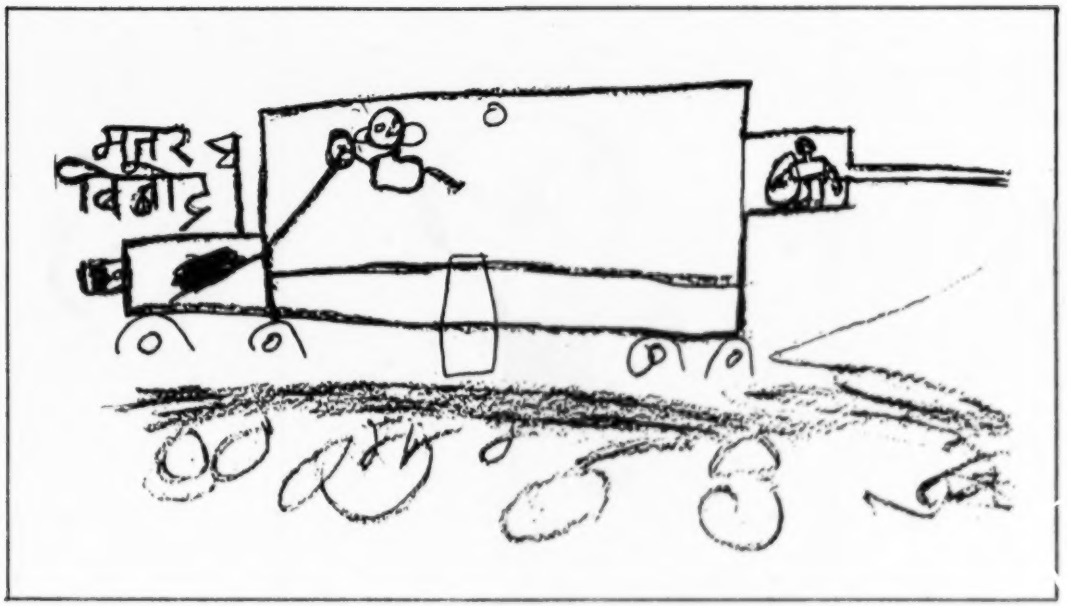

Figure 11. X-Ray drawing by a seven year old Nepalese boy. In the above example he shows both the driver and the engine as interior views. The side of the vehicle, facing the observer, is transparent. A Nepalese flag (two triangles) flies over the engine hood of the bus. The child's name, written in the Devanagri script, is directly to the left of the flag and comprises a part of the design of the drawing. Circles below the street line (base line) are children waiting to board the bus. This drawing was done shortly after the arrival of a new school bus, purchased for school transportation. College of Education Demonstration School, Kathmandu, Nepal.

Conclusions

It must be remembered that Nepal, predominantly a Hindu culture, is bound to the dictates and tenets of behavior growing out of ancient traditions. It is a highly structured society, resistant to rapid change and foreign ideas. The child, as a member of this social milieu, is subject to its cultural continuity, the way in which the individual and the society perpetuates the priorities and values of the culture. When we speak of the Nepalese child, we mean the children of Newars, Limbus, Sherpas and the many other major and minor caste or sub-cultures living within the political boundary of Nepal. It is these diverse linguistic groups that make up what we refer to as the Nepalese society.

The Nepali child uses his own symbols to describe and detail the human form. These are different from the symbols used by American children and tend to support the premise in our earlier paper that drawing for the child is a cognitive process. While drawings of Nepalese children clearly indicate regional differences through the description of costume, ornamentation, and the like, only small rather negligable differences in IQ, based on the Goodenough-Harris revision of the Draw-A-Man test, were noted. The Nepalese data, as these pertain to developmental stages of drawing, use of geometric shapes and children's symbols, i.e.: man, house, flower, etc., proved to be essentially the same as the material found in earlier Western studies of cross-cultural

Figure 12. This drawing, by a twelve year old girl, could be mistaken for the work of a younger child. The detail in the head-shape, however, is of a more mature nature. The nose form is consistent with those previously examined and the extensions from the body scheme are typical. Of interest, in this particular drawing, is the unusual positioning (vertical) of the eyebrows and the tika mark at the top of the forehead separating the head circle.

interest. The one major exception was found in the infrequent use of the Sun symbol by the Nepali.

The Nepalese social order, with its horizontal caste stratification supported by an ancient religious structure, allows minimal opportunity for the Nepali child to become involved in invention or innovation. Creativity or free expression as we understand it in the West, simply does not exist as a condition of Nepalese reality. An examination of the state of Nepalese poetry, dance, theatre, art and architecture, as it is practiced today, tends to verify the above observation. A case in point is the status of the artist, i.e., painter, stone or wood carver, bronze caster, etc. As a member of a traditionally oriented society, his art and craft practice does not enjoy a high priority value in the culture. It would follow, then, that a member (child) of a higher caste would not be encouraged by his family to participate in an activity beneath his own caste mores. While the caste system in Nepal is slowly moving away from its traditional and historical position, the transition is by nature laborious. However, today in many Nepalese primary and intermediate schools children of all castes may participate in group and integrated school activities without serious intemidation or reprisal.

Additional limitations placed on the Nepalese child, relative to drawing as an activity, are

economic. All family members are expected to contribute to the needs of an agrarian society. The concept of universal education for young children, and particularly for all girls, is as recent as the early years of 1950 (Wood, Pandey and Bahadur, 1956). Prior to that time, children had contributed to the family economy by working in the home, in the field or tending younger siblings. Finally, drawing materials and supplies suitable to children's needs, and the economic means of providing these, had been virtually non-existent.

We found that acceleration of motor skill became apparent when materials and a climate conducive to self-expression were made available to the Nepalese child. This observation has also been noted by other investigators in similar studies concerned with the art of children. Noticeable progress in developing drawing skill was seen at the demonstration school conducted by the College of Education in Kathmandu (Fig. 8, 10).

Writing and drawing enjoys the commonality of motor skill, symbolism, directionality, the experience of surface newness, the execution of design and a sense of relationships and order. Nepali boys, perhaps due to encouragement and the opportunity to write during their early years, showed a higher degree of motor skill than did girls. Neither sex, however, appeared to have a priority on imagination, fantasy life or a willingness to depart from the cultural norm.

While many symbols used in children's drawings are common to both the East and the West, the sun symbol appears to be less frequently drawn by the Nepalese. This is an interesting phenomenon inasmuch as the mandala form, or cosmic circle of eastern philosophy, is seen in many examples of Nepalese adult drawing and painting. Why the Nepali child seldom uses the sun is speculative. Lack of awareness, newness of activity accompanied by apprehension and concern, conscious or unconscious taboo, could perhaps account for this absence of such a universally used symbol. In our opinion, as drawing becomes a possibility and a reality for the Nepalese child, the sun symbol, so common in the drawings and paintings of children in the West, will emerge as a more significant symbol than current usage shows. (A recent publication of Jung's works, 1964, would be of interest to the reader who would pursue this further. Previous accounts, in regard to visual symbolism, have been treated literally and limited their thesis to conceptual rather than visual imagery.)

Generally, the Nepalese child abstracts from his real world those permitted experiences of his culture. He draws these, thereby contributing to a cultural continuity and reflection of the social values and priorities of his society. Like the children of other cultures, he tells the observer through his drawings what he understands and knows about his universe. The Nepali child does this within the limitations of his social structure, his opportunities, his maturity, his skill, i.e., his ability to transmit ideas and feelings into form through his drawings.

References cited

Arnheim, Rudolf. Art and Visual Perception, University of California Press, Berkeley and Los Angeles, 1954.

Dart, Francis E. and Pradhan, Panna Lal. "Cross-Cultural Teaching of Science," Science, 1967 Vol. 155 No. 3763, p. 649-656.

Dennis, Wayne. "Performance of Near Eastern Children on the Draw-A-Man Test," Child Development, 1957, 28, p. 427-430.

Du Bois, Cora. The People of Alor, University of Minnesota Press, 1944, Vol. ii, Chap. 21, Children's Drawings, pp. 566-587.

Eng, Helga. The Psychology of Children's Drawings, Kegan Paul, Trench, Trubner and Co., Ltd., London, 1931.

Harris, Dale B. Children's Drawings as Measures of Intellectual Ability, Harcourt, Brace and World, Inc., 1963.

Jung, Carl (Ed.), Man and His Symbols, Aldus Books Limited, London, 1964.

Lowenfeld, Viktor. Creative and Mental Growth, The MacMillan Col, N.Y. 1947. Revised 1952, 1964.

Paget, G. W. "Some Drawings of Men and Women Made by Children of Certain Non-European Races," Journal of the Royal Anthropological Institute, 1932, 62, 127-144.

Read, Herbert and Smith, Marion (Ed.), The Artist in Tribal Society, Proceedings of a Symposium Held at the Royal Anthropological Institute. "Art in an Aboriginal Society: A Comment," The Free Press of Glencoe, N.Y. 1961, p.21.

Rowland, Benjamin. The Art and Architecture of India, Buddhist Hindu, Jain, Penguin Books, Baltimore, Md. 1953.

Sundberg, N. D. and Ballinger, T. O., "Comparisons of Nepalese and American Children's Drawings of Man, Woman, and Self." American Psychologist, 1962, 17, 305 (Abstract).

Sundberg, Norman and Ballinger, Thomas. "Nepalese Children's Cognitive Development as Revealed by Drawings of Man, Woman, and Self." Child Development, 1968, Vol. 39, No. 3, p. 969-985.

Terwilliger, Wesley B. A Cross-Cultural Study of Nepalese Children's Drawings. M.A. thesis, 1960. University of Oregon Library, Eugene, Oregon.

Wood, H. B., Pandey, S. R. R., Bahadur, K. C., K., (Ed.) Education in Nepal: Report of the Nepal National Education Planning Commission, Bureau of Publications, College of Education, Kathmandu, Nepal, 1956.

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